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Heat and Corrosion-Resistant Alloys

Stainless Steel, What It Is and How It Was Discovered— Analyses and Properties of Three Chief Types —Chrome Irons for Structures

BY T. HOLLAND NELSON

ATTACK due to corrosive conditions in liquids or atmospheres at normal temperatures, on the one hand, and destruction of material due to loss (scaling) at high temperatures in various gases, on the other, are subjects that may not seem to be closely enough associated for treatment in one series of articles.

Yet the author hopes to deal to some extent with both subjects and show how a series of steels and alloys designed to combat corrosion become equally interesting in the field of heat resistance. This is not really strange, for the very necessity that led to the discovery of "stain-

less steel" by Brearley was a problem involving both conditions.

How Stainless Steel Was Discovered

The story is so well known today that details are unnecessary. Brearley's problem was to produce a gun lining that offered increased service. The destruction of a gun lining is due to two causes—erosion and corrosion. Sufficient heat is generated in the firing of a gun of large caliber to actually fuse a thin film of metal in the lining. This was apparent in the early stages of the investigation and

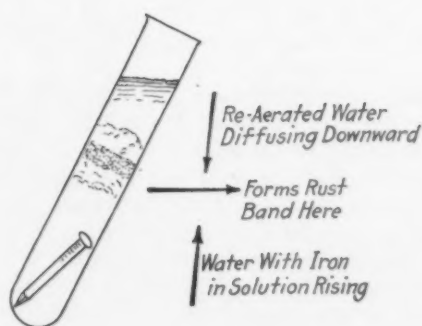
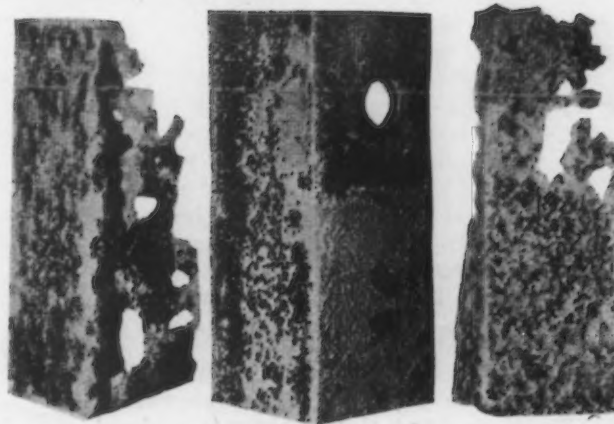
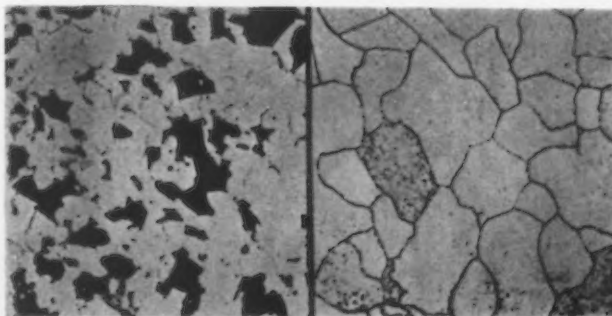


Fig. 1 (Above)—A Simple Explanation of the Formation of Rust. Fig. 2 and 3 (Upper Right)—Photomicrographs of Pure Iron (Left) Showing Grains of Same Type and of Mild Steel Showing Dissimilar Grains (by Brearley). Fig. 4—Comparative Rusting of Iron (Center Piece) and Steel (Cushman)



BORN in Sheffield, England, in 1890, Mr. Nelson was educated in the metallurgical department of Sheffield University. His early experience was gained with Thomas Firth & Sons, Ltd., of that city. He finally became assistant to Harry Brearley, inventor of stainless steel, when the latter was head of the Brown-Firth Research Laboratory, also at Sheffield. Later he joined Messrs. Darwin & Milner, Sheffield, as assistant works manager in charge of five plants. Coming to the United States in 1913 as metallurgist to the Simonds Mfg. Co., at the Lockport, N. Y., plant, he later became superintendent of the steel works of Henry Disston & Sons, Philadelphia. He returned to England, joined the army and later was associated with Peter Stubs, Ltd., as works manager, finally becoming managing director of that company's Rotherham Works. Returning to America in 1920, he rejoined Henry Disston & Sons as production manager, being finally placed in control of all heat treatment and metallurgical research.

Within the last three or four years Mr. Nelson has been associated with practically all the large chromium-iron installations built for the American chemical industry. He is a member of the American Iron and Steel Institute, American Society for Testing Materials, American Society for Steel Treating, (British) Iron and Steel Institute, Sheffield Society of Engineers and Metallurgists, and the American Institute of Mining and Metallurgical Engineers. He is now a consulting metallurgist, with offices in the Widener Building, Philadelphia.



immediately brought up the need of a material with a high melting point and considerable heat resistance.

To accomplish this Brearley commenced a study on chrome-iron combinations of varying percentages: Low-carbon chrome alloys were chosen because low carbon was essential to maintain a high melting point and chrome was expected to aid in obtaining the physical properties necessary in the absence of carbon. It happened to be the author's privilege and pleasure to be associated with Harry Brearley at this time.

Those steadily engaged in research fully appreciate that often "real discoveries" are the outcome of careful observation "along the road" rather than the actual result of a previously laid-down formula. A research mind must be ever open to grasp a possible lead, for often the solution lies far from the beaten track.

Non-Etching Property a Real Factor

In Brearley's case it was a gun lining which prompted the investigation, but it was the observed fact that some of the alloys produced in this research did not "etch" ordinarily that ultimately led to the discovery of stainless steel. The lay mind delights to weave romance around such discoveries and will call them "accidents." Such a term is grossly unfair to the research chemist. "Careful observation" is more often the true reason.

How did this observed fact that certain acids did not etch some of the alloys under investigation lead to the discovery of stainless steel? The art of etching is to immerse a material in a suitable solution which will attack its various component parts at different rates, or leaving a condition of light and shade which gives us micrographically an opportunity of observing the various component parts. This result is due to the different rates of solubility of the various elements or compounds contained in the metal.

What then, was the chief discovery of this research?—"That certain alloys of chrome in iron were insoluble in certain liquids." There seems little romance in these words, and yet that sentence represents a definite accomplishment and should be sufficient inspiration to every research mind that there may be other alloys of iron insoluble in other corrosive liquids. We have yet to find an entirely satisfactory metal to deal with such acids as sulphuric and hydrochloric on a commercial scale.

Various Theories of Corrosion

At the present time there is much technical research into, and considerable discussion of, the phenomena of corrosion. There are claims that passivity is produced by an oxide film or coating on the material; others contend that a gaseous film of oxygen renders certain materials

passive; then, of course, we have the acid and electrolytic theories.

Whatever may be the phenomena that render certain materials active or passive under certain corrosive conditions may still be debatable, but we do know that certain materials will withstand attack where others fail, and, while thoroughly appreciating the work of these various investigators, the actual user is often more directly interested in whether a material will withstand his condition than with the explanation of the phenomena that govern the result.

Corrosion Simply Explained

The explanation offered by Brearley to the author in the early days of stainless production is readily understood and does not clash with any reliable work to date, so that for the purpose of this series of articles, corrosion can be made to appear a very simple subject without conflicting with any of these theories. Corrosion is generally expressed in terms such as "loss in weight" and "pitting," etc. These two expressions are sufficient for my purpose.

Few people realize that iron is soluble in water just the same as sugar or salt, but in a lesser degree. A simple experiment carried out on your office desk will illustrate this.

Take an ordinary "bright" carpenter's nail and place it (after weighing) in previously boiled water in a test tube. Pour in enough of the boiled water to cover the nail, and then ram in a pad of cotton wool or filter paper pulp, as illustrated, and continue the addition of water. (Fig. 1.) In the course of time a band of rust will form in the cotton wool, whereas the nail will remain bright.

The experiment may be continued until flocculent rust begins to form in the water beneath the cotton wool. What is established is that rust will form with the nail remaining bright, and careful weighing of the nail will show a distinct loss of weight, confirming the fact that iron is soluble in water, and that "rusting" is a secondary condition.

Therefore, if it is possible to add to iron some alloy that will render it insoluble in any particular solution, it is also rendered rustless and resistant to corrosion under those same conditions.

Chromium Makes Iron Insoluble in Water

Brearley, therefore, discovered that chromium in certain proportions in iron rendered iron insoluble in water and many acid and alkaline solutions.

But the field of corrosion-resistant metals has been barely touched, and I venture to say ere long other alloys will be available to deal with such acids as sulphuric, hydrochloric, etc. Alloys are already known, but in most

cases either price or the unworkability of the materials retards their development.

What Is Stainless Steel?

IN the first place it would perhaps be as well to ask ourselves what stainless steel is. The term "stainless," or "rustless," has led to a great deal of misunderstanding. In considering the name it should be borne in mind that the iron-carbon-chromium stainless steel first made its commercial appearance through the cutlery industry, and its success was due to the fact that, under such conditions as those under which ordinary cutlery is used, the material was both rustless and stainless. It should, however, be remembered that cutlery articles are invariably hardened, tempered, ground and polished. These materials are not stainless, nor are they rustless, under *all* conditions, and the author feels that the term "rust and corrosion resistant" is much less misleading.

Why Are Certain Types Resistant to Corrosion, Stain or Rust?

TO obtain an understanding of the fundamental principles governing corrosion-resisting steels, it should first be thoroughly understood that iron is soluble in water and, secondly, that iron combined with carbon is not only soluble in water and, therefore, rusts like iron, but that the corrosion is much more rapid, due to the galvanic action between the iron itself and the carbides of iron. This creates selective corrosion and pitting. For this reason iron of the purest varieties, under corrosive conditions, has always withstood such corrosive action better than steel.

To obtain a corrosive-resistant iron, therefore, it is necessary to introduce some alloy, or alloys, to iron which will first render it insoluble, and then, if there be carbides present, prevent, if possible, galvanic action from setting up selective corrosion or pitting.

Brearley apparently covered in his patent the range of chromium between 9 and 16 per cent, knowing that heat

treatment was essential to produce homogeneity, and realizing that over 16 per cent chromium additions rendered the material immune to heat treatment in the sense of hardening. Since that time, however, the higher chromium alloys have been further developed and, even where free carbides exist, the material is found to be extremely resistant to corrosive attack.

With the knowledge, therefore, that certain percentages of chromium in combination with iron render the resultant iron-chromium insoluble in water and many other solutions, and that the carbides present in such alloys, with less than 16 per cent chromium, can be diffused throughout the mass (i.e., dissolved into the iron-chromium matrix) by heat treatment, it is seen that a material can be produced which is insoluble in water, and which possesses that homogeneity which removes the possibility of galvanic action. Such a material, therefore, could be termed a corrosion-resistant alloy.

Stainless steel, in the last 12 years, has found many and varied uses, particularly in the cutlery industry, the manufacture of turbine blades, various hydraulic and automobile parts such as pump shafts, and in the engineering trades in general, where a material with high physical properties and substantial corrosion resistance is required.

Output of Stainless Steel

The increased production of stainless steel can best be gaged from the fact that in the year 1913, when it first became a commercial article, it was the product of the clay pot crucibles of Sheffield, England, and the entire tonnage for that year was probably under 50 tons. During the war its development was delayed, due to the fact that chromium was substantially controlled for the manufacture of munitions. The manufacture of this material passed from the crucible to the electric furnace, with the increasing demand for tonnage, and in the year 1926 sales in the United States reached 4000 to 6000 tons. The production of lower carbon ferrochrome made possible the

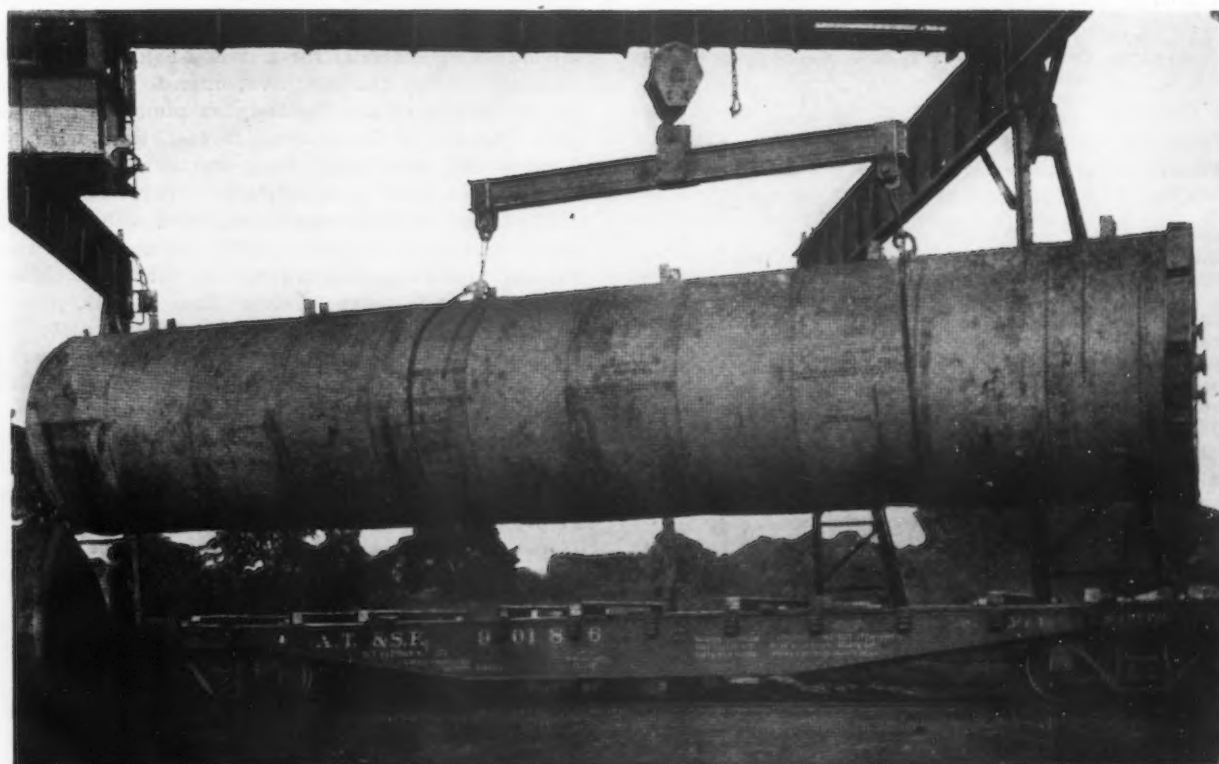


Fig. 5—One of 16 Towers in the First Chrome-Iron Nitric Acid Installation in the United States

introduction of the chrome-iron series, and the tonnage of the combined stainless steels, chrome irons and nickel-chrome alloys of related types is an ever increasing one.

Chief Types of Stainless Steels

The physical properties of stainless steel vary substantially with the carbon and chromium contents. This is illustrated in the tables:

Analysis and Properties of Stainless Steel

	Per Cent
Analysis: Carbon	0.37
Manganese	0.15
Silicon	0.19
Chromium	12.00
Nickel	0.55

Treatment: Air-hardened from 1700 deg. Fahr. and reheated as shown:

Re-heating Temp., Deg. Fahr.	Elas. Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elong., Per Cent	Red. of Area, Per Cent	Izod Impact, Ft. Lb.	Brinell No.
925	.....	232,900	9	24	8	444
1100	126,300	141,100	15	42	15	285
1300	104,800	120,900	21	52	30	241

This material air-hardens from hot working temperatures and should be annealed, or tempered, if any machining and any degree of toughness are necessary.

Analysis and Properties of Mild Stainless Steel

	Per Cent
Analysis: Carbon	0.15
Manganese	0.16
Silicon	0.09
Chromium	11.8
Nickel	0.77

Treatment: Oil-hardened at 1700 deg. Fahr., and reheated as shown:

Re-heating Temp., Deg. Fahr.	Elas. Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elong., Per Cent	Red. of Area, Per Cent	Izod Impact, Ft. Lb.	Brinell No.
925	.....	199,600	10	36	16	402
1100	94,000	126,300	20	52	35	255
1300	85,100	104,800	26	58	60	223
1400	69,900	98,300	28	61	68	207

Analysis and Properties of Stainless Iron

	Per Cent
Analysis: Carbon	0.07
Manganese	0.12
Silicon	0.08
Chromium	11.7
Nickel	0.57

Treatment: Oil-hardened from 1700 deg. Fahr. and reheated as shown:

Re-heating Temp., Deg. Fahr.	Elas. Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elong., Per Cent	Red. of Area, Per Cent	Izod Impact, Ft. Lb.	Brinell No.
400	.....	163,500	12	38	34	340
575	.....	162,200	12	36	38	332
750	.....	162,200	15	51	38	332
925	131,700	162,200	18	52	36	340
1100	85,100	109,700	22	62	65	241
1300	68,500	90,500	26	66	79	196
1400	62,700	81,500	31	69	87	179

This material is termed stainless iron in Europe, and by some of the American manufacturers operating under European patents. It is, however, apparent from the above figures that this material, exhibiting, as it does, distinct hardening properties, would be more correctly designated as a very mild stainless steel, and, while it does not possess the maximum resistance to corrosion, it has physical properties of distinct value in certain fields, and in view of the low-carbon content and the consequent small amount of free carbide that exists, it does possess in all conditions a substantial resistance to corrosive attack.

These Alloys in Structural Work

FOLLOWING the development of the material covered by the Brearley patents, various modifications of the 9 to 16 per cent chromium alloy were advocated and demonstrated both in Europe and the United States. Dr.

F. M. Beckett has done much in this line, as had also P. A. E. Armstrong, in the development of extremely low-carbon, higher chromium with silicon alloys, but generally speaking, these high-priced alloys had become the product of the tool steel manufacturer, and while some of them were available in sheet form, practically nothing had been done in the field of general structural work, as it was generally considered that the price of the material itself rendered it impractical for general structural fabrication.

It was at this stage of the industry that one of the largest chemical and explosive manufacturing concerns in the world discovered that some of these chromium alloys offered sufficient resistance to nitric acids of varying strengths to warrant building manufacturing installations covering tanks, towers, connections, pipe lines, etc., using high-chromium material in the form of plates, angles, channels, I-beams, tubes, rivets, etc. and assembling the whole along the lines of ordinary mild tank steel. At this time the author was called in to pass an opinion on the possibilities of building such equipment.

The materials available were substantially of the stainless steel hardening types, except in some few instances where the materials referred to under the Beckett and Armstrong patents had made steady progress in development in bar form and in the sheet industry.

With this somewhat limited range of materials to draw from, some of the difficulties confronting the production of fabricated installations of the type illustrated in Fig. 5 can be imagined. The building of such installations required a material malleable in the cold, obtainable in all the variety of shapes and sections called for by the designing engineers, and capable of being assembled by substantially standard boiler shop practice which, of course, included riveting or welding the shell together.

With the materials available, it is perhaps not surprising that the early attempts to either rivet or weld plate material were far from satisfactory. So little was known in general regarding the chemical analysis, and its effect upon the physical properties and hardening tendencies of the material, that many troubles were at first encountered by those who made some early attempts with the limited knowledge available.

It should be clear to those interested that to use an air-hardening material for a rivet would lead to disaster, because driving the hot rivet into a cold shell would harden the rivet as effectively as plunging it in water. This produced brittle rivets. In fact, the author, in the early stages, saw material put together with such rivets, the heads of which would fly off as they became cold.

The same difficulty was encountered with welded areas, which were hard and brittle after cooling, except that the welding problem was aggravated by other difficulties also. This phase was rather discouraging. On the one hand, we had the chemist stating that he needed a material containing over 14 per cent chromium; on the other hand, the fabricator was trying to buy a material of this desired chemical composition, not realizing that at one critical point (i. e., 16 per cent chromium) the physical properties and general behavior of the material underwent a substantial change. Therefore, in obtaining material of 14 per cent chromium content in one instance, and 16 or 17 per cent in another instance, some of the early fabricating experiences were not only expensive experiments, but also led to disappointing results.

To build installations such as the tower shown in the illustration it was speedily determined that material showing either no hardening tendency at all, or at least so slight as to be almost negligible, was essential, and this leads us into the subject of the type of chromium iron that has been extensively used over the past four years in the United States in manufacturing the various large installations for the production of nitric acid. This will be the subject of the next article.



Sponge Iron by the Smith Process

Vertical Ovens Like Coke Ovens Used
—100 Per Cent Reduction Claimed
—Will Directly Assist Blast Furnace

BY DR. GEORGE B. WATERHOUSE*

THE process of the General Reduction Corporation, Detroit, for the production of fine sponge iron, is the invention of William H. Smith, president of the company. For many years Mr. Smith was connected with the Ford Motor Co., and had an important part in every step of the building of that company's many great plants. In recent years he had charge of the examination and acquisition of extensive coal, ore, mineral and timber lands in carrying out the Ford policy of making his industries independent in regard to raw materials. He also was head of the research division and active in many and varied metallurgical developments.

Creation of the Smith process and the low-temperature reduction ovens was to meet the demand for better iron and steel and to make available the abundant iron ore reserves not being worked by the present methods of iron smelting because of their low iron content or unsuitable gangue. However, it has proved to be economical with high-grade ores and magnetic concentrates as the reduced material requires no further work or concentration.

Ovens Similar to Coke Ovens Used

The process consists in the reduction of iron ores or iron oxide materials such as roll scale, mill scale and magnetic concentrates in vertical ovens or retorts, at comparatively low temperatures and without fusion, usually in contact with solid reducing materials. The ore should be crushed to size depending on its character, usually not over $\frac{1}{4}$ in.

It is mixed with carbonaceous material and charged into the ovens shown diagrammatically. Here may be seen a battery of reduction ovens, partly in section. The charge is heated and cooled by means of horizontal flues, the general construction being similar to a battery of by-

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Briquettes of Reduced and Magnetically Concentrated Sponge Iron

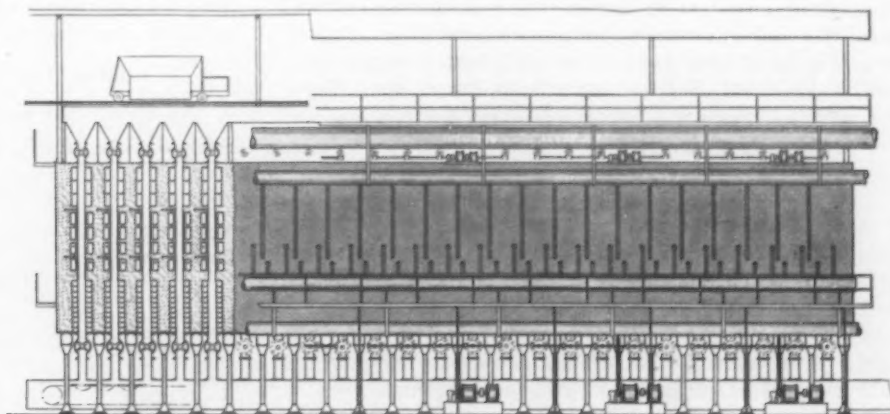
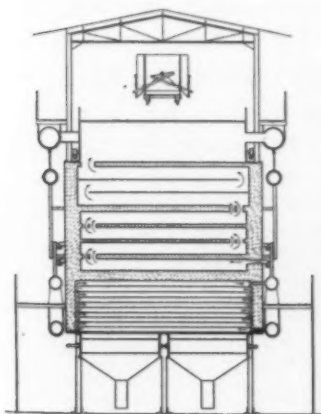
product coke ovens. It is preheated in the upper part of the oven by the waste gases, which leave the stack at about 400 deg. Fahr. Then it enters the reduction zone where temperatures range from about 1600 to 2000 deg. Fahr., and after reduction the charge is cooled by the incoming air for combustion in the heating flues, being discharged at less than 250 deg. Fahr., usually cool enough to touch.

Unlimited Amount of Heat at 1500 to 2000 Deg.

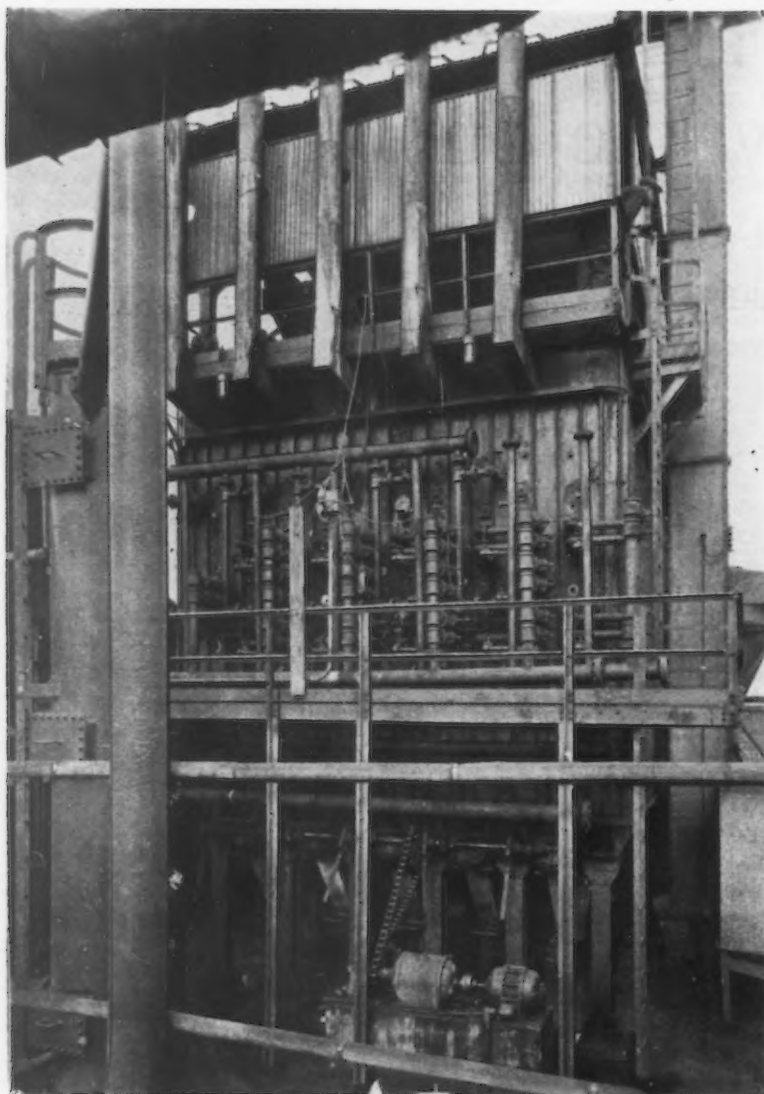
Arrangement of the flues may be clearly seen from the sectional part of the diagram. After reduction, the material is further crushed if necessary, magnetically concentrated and usually briquetted. Two views of a battery of five ovens with a daily capacity of 50 tons reduced material are shown by illustrations, also some briquettes.

One factor leading to the success of the process is the ability to apply unlimited amounts of heat at 1500 to 2000 deg. Fahr., just where needed for the reduction reaction without affecting the rest of the apparatus. Also precise and automatic regulation can be employed as to quantity and duration of heat in the various zones, more particularly the reduction zone. The ovens shown are 10 in. wide, 16 ft. 6 in. high, and 20 ft. long. Standard steel sections and fire brick shapes have been used in construction and special materials for good heat interchange between the cooling and heating flues and the charge. For instance, carborundum is being used in the reduction zone.

The special type of design leads to a minimum loss of heat by radiation. With the 5-oven plant, this is estimated at 7 per cent with a temperature of 1600 deg. Fahr. in the reduction zone. As more ovens are added to the battery, this loss decreases until, with 50 ovens, it would



Battery of Smith Reduction Ovens, Partly Diagrammatic



Battery of Five Smith Reduction Ovens for Sponge Iron

be about 3½ per cent, after which there would be very little further decrease. The cost of these ovens, based on results with the 5-oven plant, is about \$3,000 per ton iron produced.

Many Kinds of Ore Have Been Worked On

Ores from all the principal ore producing countries have been received, worked on and studied by this method, but most work has naturally been carried out with Lake Superior ores readily obtainable at Detroit. Very good results have been obtained with pyrites residues.

Also many kinds of carbonaceous materials have been used as reducing agents, such as charcoal, hardwood waste, coke, coke breeze, anthracite, peat, brown coal, oil shale, tar, and gilsonite which is a natural pitch. Special materials have been tried, such as pressed sugar cane, coffee bean husks, Babassu nuts from Brazil, etc. These nuts were an important source of supply for charcoal for gas masks during the war.

Some Interesting Results Obtained

Many interesting results have been obtained. The ovens act as gas producers as well as reducing ovens and one or more could be used to produce gas if needed. The gas tank, shown at the left in one illustration, is for the storage of the excess gases produced before they are burned in the heating flues. The table gives analyses and heating value per cubic foot of some of the gases.

Non-coking and brown coals are very suitable for the process. It may be necessary to prepare coking coals in

one or more ovens, saving the gases given off and using the coke. Much work has been done with hardwood waste, which is sent by compressed air through a pipe from a neighboring automobile body plant. This is being used as soon as received, not stored in any way, the ligneous gases produced being directly consumed. However, sufficient work has been done to show that the by-products recoverable from such wood waste would be of great value, including acetic acid for making lacquers, and alcohol. At present 1470 lb. of such wood waste are being used for each ton of 50 per cent iron ore; if charcoal is used, 460 lb. are employed.

Reduction Is 100 Per Cent

Reduction of iron oxides to metal is 100 per cent. An interesting feature is that, if time is given, the reduced iron will absorb carbon. The amount of carbon taken up can be controlled up to about 1.8 per cent. This will be of importance if the reduced material is to be subsequently remelted into steel or pig iron. A few operating results may be given.

Working on a 45 per cent magnetite, the reduced material showed complete reduction of the iron with 85 per cent total iron. After separation and preparation it showed 98 per cent iron.

Mahoning hematite ore with 64 per cent iron showed 92 per cent after reduction and a final result of 97 per cent.

Imperial, a Lake Superior hematite with 44 per cent iron, showed 72 per cent after reduction and a final result of 93 per cent.

Roasted pyrites or "blue billy" with 55 per cent iron showed 80 per cent after reduction and after concentration 90 per cent. Also this last material showed a final sulphur of only 0.08 per cent.

Many Uses for Sponge Iron

Regarding the field of application of the process, sponge iron has found use as a precipitating agent in the metallurgy of copper, lead and silver. Such applications and others are covered in Bulletin No. 270 of the Bureau of Mines, 1927, on "Sponge Iron." The Smith process provides a commercial practical method for the making of sponge iron on either a large or small scale from many raw materials and with the use of different heating agents. The gas produced in the process can be burned in the heating flues. Fuel oil is being used with great success. Producer gas, coke-oven gas, or other available gaseous fuels can be employed. Electric heating coils have been successfully used and, if electricity is available, an installation would be excellent for balancing the power load. The radiation loss being low, the furnaces could be maintained at little cost below working temperature until off-peak power was available.

Better Iron and Steel Claimed Possible

As mentioned earlier, one incentive for the development of the Smith process was the need for better iron

Reduction Materials and Percentage of Gases Obtained

Material	CO	CO ₂	H ₂	CH ₄	C ₂ H ₆	Ill.	N ₂	O ₂	Btu.
Wood waste....	40.0	14.0	41.6	...	1.0	...	2.8	0.6	277
Sawdust	58.4	5.2	19.9	...	1.1	0.2	12.0	3.2	280
Brown coal....	...	...	...	...	...	...	...	...	835
Peat	67.2	25.2	7.0	...	...	...	0.4	0.2	253
Oil shale.....	21.6	14.6	31.8	7.8	1.0	0.2	21.0	1.8	263
Tar	4.8	4.0	22.6	40.0	...	18.0	10.0	...	758
Coke breeze....	...	...	...	...	...	...	...	...	638
Sugar cane.....	19.2	19.0	28.2	11.4	...	1.4	18.8	2.0	280
Babassu nuts...	22.4	7.6	37.4	...	16.8	0.4	13.0	2.4	481
Gilsonite .....	...	...	...	...	...	...	...	...	1100

and steel. High-grade magnetite concentrates and other ores can be reduced by this process and the product used as full or part raw material for making high-grade steels and iron. Such practice is being followed to an increasing extent by the use of imported Swedish sponge iron with claims made of a resultant improved final steel. Makers of tool steels and high-grade alloy steels could install this relatively low cost equipment, using pure magnetite concentrates or other good ores and supply part or all of their raw material. There would seem to be no particular virtue in Swedish ores compared with similar ores here or in other parts of the world.

Of Direct Assistance to the Blast Furnace

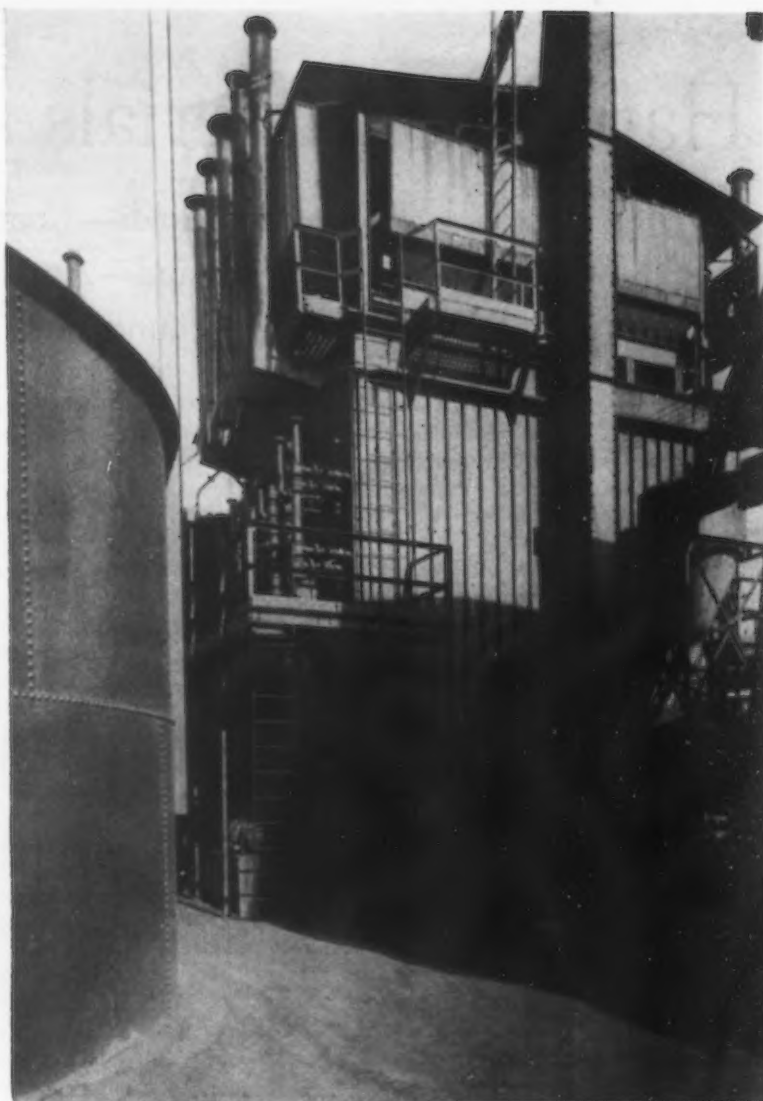
In the large tonnage iron and steel industry, this process may be looked upon as of direct assistance to the blast furnace. It provides a desired high-grade product as a supplement to the present pig iron with less initial plant cost and much less heat consumption and loss than the modern blast furnace. One striking fact is that it is economical in small units and it may very properly be installed at plants, or in countries and locations where a blast furnace plant could not be considered. It is also seen as of great assistance to the present steel industry as an immediate method of producing good and high-grade raw material. It would remove the necessity of smelting fine ores in the blast furnace where notably better operating results are obtained by using coarse materials.

The process has been protected by patents in over 30 countries, two of the United States patents being Nos. 1,692,587 and 1,692,588, Nov. 20, 1928. While no publicity has been given, it has been freely shown to technical men and engineers of this country, many countries of Europe, South America and Japan. It is backed by very large financial resources and a full engineering, technical and consulting staff at the University of Detroit and 1601 Frederick Street, Detroit. Finally, it is the intention of Mr. Smith and the General Reduction Corporation to exercise every effort in the application of these ovens and processes that will bring about economical production and improved quality of reduced iron, cast iron and steel.

Zinc Dust in Cyanidation

Zinc dust is now generally used to precipitate precious metals from the mill solution. It is well known that zinc enters the cyanide solution in direct proportion to the metals precipitated. Experiments conducted at the Rare and Precious Metals Experiment Station of the United States Bureau of Mines, in cooperation with the University of Nevada, Reno, Nev., indicate the importance of avoiding the use of any considerable excess of zinc over that needed to precipitate the metals from the cyanide solution, because the zinc dust is quite readily soluble in the usual mill cyanide solution. In a large excess of 2.9 lb. clean cyanide solution at room temperature, approximately 38 per cent is dissolved in $\frac{1}{4}$ hr., 62 per cent in $\frac{1}{2}$ hr., 70 per cent in 1 hr., and 90 per cent in 2 hr.

Presence of lime retards the action, but complete dissolution of the zinc is effected in 16 hr. in the presence of 5 lb. of lime per ton. Increased strength of cyanide in solution or increased temperature of solution hastens the dissolution of zinc dust. The accumulation of zinc in mill



General View of Battery of Five Smith Reduction Ovens

solutions adversely affects the extraction of the precious metals, particularly silver. This is quite noticeable when the zinc content is 0.1 per cent, and shows serious loss before the zinc content equals 0.5 per cent.

New Lining for Electric Furnace

S. J. Hewitt, chief metallurgist Edgar Allen & Co., Ltd., says that a most important development in high-frequency furnace work (as applied to steel melting) is a new lining to replace the plumbago crucible.

"The bottom of the furnace body is packed as usual with insulating material. Inside the inductor coil is placed an insulating sleeve. Now a mild steel former made of $\frac{1}{8}$ -in. mild steel sheet, the shape of the crucible that is required, is placed in the center of the coil so that an annular ring of about $1\frac{1}{2}$ in. is left between the former and the insulating sleeve. This is filled up with silica grains, of which at least 30 per cent of the quartz has been inverted to tridymite by prolonged burning, and 3 per cent boric acid.

"This mixture is tightly packed round the steel former and then a small current is put through the coil. As the former becomes heated the current is increased gradually until the melting point of the steel is reached. It then runs down into the bottom and leaves a fritted lining.

"In this type of container an average of 35 heats can be melted. Its initial cost is not more than that of a plumbago crucible and the weight of steel that can be melted in it is considerably more."

Handling Materials in the Foundry

Best Way to Transport Molds—Continuous Systems Reduce Amount of New Sand—Anti-Friction Conveyors Discussed at Foundrymen's Convention

WAYS and means of transporting materials in the foundry were described and their benefits analyzed at the materials handling session of the thirty-third annual convention of the American Foundrymen's Association, April 8 to 11, in Chicago. "Mold Handling" was the theme of a paper prepared by R. J. Heisserman, Link-Belt Co., Philadelphia, and read in the author's absence by J. J. Hartley, Chicago. The presentation and discussion of this paper formed the first half of the program, the second half consisting of an exhaustive treatise on "Materials Handling in Gray Iron Foundries," by Albert Walton, consulting engineer, Philadelphia. The good attendance at the meeting attested to the interest that foundrymen are taking in such problems.

How Molds Should Be Handled

AS it is necessary to have a sand-handling system working in conjunction with mold conveyors to get the full benefits of the latter, it is almost impossible to determine the exact savings attributable to mold conveyors, declared Mr. Heisserman. However, there are a number of factors resulting from a combination of sand and mold-handling equipment in a continuous pouring gray and malleable iron foundry which contribute to production economies. Continuous operation means a steady flow of materials and of products and better service on rush orders.

Castings can be inspected 10 min. after molds are made, stated the author, whereas under the old system imperfect castings, due to poor sand, patterns, or metal, are not discovered until a day's production has been poured. It also is possible to standardize more on flask equipment, as a larger volume of sand in some flasks will not affect molding costs. Moreover, a reduction of 75 per cent in the number of flasks is obtained, the volume of production of molds at the same time being increased. The molders' efficiency is improved from 60 to 65 per cent by materials handling equipment.

Night Shifts Can Be Done Away With

Elimination of night shifts saves from \$100 to \$150 per night, asserted Mr. Heisserman, who said that a complete continuous unit requires less than 30 per cent of the floor space of a floor type foundry and has double the capacity. Continually performing one operation, the workmen become specialists and a large part of the work, formerly done by them, can be done by common laborers. Furthermore, there is less tendency to break a mold in placing it on a mold conveyor than when the molder carries it out and sets it on the floor.

The author pointed out that continuous pouring requires a minimum number of men working through the entire day on the pouring gang, as it does away with the extra labor required when a large volume of metal is poured in a comparatively short time. Another factor contributing to economy is the delivery of castings to one point by the conveying unit. The continuous system reduces substantially the amount of new sand which

must be purchased. In addition, continuous operation tends to speed up production.

Conveying Systems Mean Savings

Any type of foundry that has increased its volume of business so as to warrant new buildings can make a three-fold saving by the introduction of a conveying system in its old buildings, said Mr. Heisserman. The first saving comes from the advantages of continuous or semi-continuous production. The second accrues from the fact that sand and mold handling equipment costs less than half the amount required for erection of new buildings. The third saving results from curtailment of floor space which makes possible sufficient room to accommodate the extra core and cleaning room requirements.

Mr. Heisserman outlined the history and development of power mold conveyors. Among recent installations he cited a conveyor for handling molds of 500 lb. to 600 lb. over a great distance with low power consumption. This conveyor is known as the "anti-friction" type, because of the liberal use of high-grade tapered roller bearings. The tracks of the conveyor are attached to the under side of the trays, making it impossible for metal or sand to fall on them for, besides being inverted, they are always under the tray. The chain is likewise protected in its position under the inside edge of the tray. The inverted tracks ride on large-diameter rollers, having pressure lubricating attachments for the roller bearings on which they revolve. The trays completely cover the rollers, as they are overlapping, making a continuous moving platform, and the rollers are thus protected from sand and iron.

Production Increased 400 Per Cent

Discussing the points brought out in Mr. Heisserman's paper, J. E. Linabury, Oakland Motor Car Co., Pontiac, Mich., stated that in one of the General Motors foundries production has been increased 400 per cent and floor space reduced 50 per cent by the adoption of new methods, including installation of materials handling equipment. He emphasized that full advantages of mechanical transportation are not gained unless the entire problem instead of only that of conveying molds is considered. Care must be exercised in picking out the right conveyor for the right job.

E. S. Scott, Ohio Foundries, Inc., Cleveland, remarked that the main development in materials handling in the foundry must be in small foundries. He added that installation of new equipment in old buildings is not always possible, even though it might be desirable. Referring to Mr. Heisserman's description of a sliding conveyor capable of handling molds weighing 300 lb., Russell Scott, Packard Motor Car Co., Detroit, said that his company's gray iron foundry is handling molds up to 3600 lb. on a similar conveyor.

The day of the sliding conveyor is passing, according to H. L. McKinnon, C. O. Bartlett & Snow Co., Cleveland, who stated that the tendency is toward reduction of power and wear. Protection of equipment and the materials

beneath the equipment, safety of the workmen and the reduction of wear are primary considerations in designing materials handling devices. Present-day production methods are forcing the smaller operators, especially in the non-ferrous field, into adopting these comparatively new practices. Mr. McKinnon declared that the current tendency is toward making the entire manufacturing system, from the pattern to the finished casting, a continuous process.

In discussing the question of determining responsibility for defective castings, Russell Scott said that, in the Packard foundry, the entire group of workmen is penalized, even though the fault be traced to one man. An advantage of the continuous conveyor for carrying molds, stated Mr. Hartley, lies in the fact that it is designed to have from 20 to 30 per cent excess capacity and to have a variation of speed, these two factors giving the conveyor a flexibility which prevents tieups in case of interruption of regular schedules.

D. B. Hill, Jr., Palmer-Bee Co., Detroit, in a written comment, described a pendulum or trolley type of mold conveyor which is comparatively inexpensive. He also referred to an improved design in the tray type conveyor.

How to Handle Materials for Gray Iron

IN his paper on "Materials Handling in Gray Iron Foundries," Mr. Walton said that the modern foundry should have handling facilities for the following operations:

1. Unloading raw materials.
2. Stocking them in yards and bins.
3. Rehandling from yards and bins to cupola charging floor and to cupola.
4. Rehandling from yards and bins to molding and core rooms.
5. Receiving and storing, in suitable stock rooms, all necessary materials and supplies, repair parts, etc., required in conducting operations, and not stored in bulk in yards and bins.
6. Necessary facilities for withdrawing from such store rooms, and delivering to the place at which needed, the various commodities kept therein.
7. Handling of molds from molder to pouring floor by suitable conveying tables, etc.
8. Handling of molten metal to molding and pouring floors.
9. Handling of molding and core sand to their respective floors.
10. Shakeout of flasks and removal of castings, scrap and sand.
11. Delivery of castings to cleaning room and to tumbling barrels and sand blast machinery, etc.
12. Removal of castings from cleaning room to inspection department and to manufacturing and shipping departments.
13. Removal of dust from cleaning rooms and from tumbling barrels and sand blast equipment.
14. Conveying of foundry sand to sand removing and bonding equipment, and subsequent delivery of foundry molding sand to hoppers and bins.
15. Handling of flasks from storage to foundry and return.
16. Handling of patterns from storage to foundry and return.
17. Handling of cores from core room to foundry.

Cost Factors to Be Considered

In the installation of labor-saving equipment for handling purposes, Mr. Walton said that the following factors relating to costs must be considered:

1. Present labor cost of doing work over a reasonable period of time. One month would be a fair average when a foundry is running on normal output.
2. Maintenance, repair and other overhead expenses for present equipment.
3. Cost of present method of handling materials which will be affected by improved mechanical devices.

4. Estimated cost of new equipment, including installation.
5. Maintenance and repair of new equipment, including fair charge for depreciation and for other general expenses.
6. Labor cost of operating new equipment for same time and under same conditions as old equipment.
7. Total cost of proposed method of handling.
8. Salvage value, if any, of equipment to be discarded.
9. Saving to be effected by adoption of new plan.

The author described various foundry uses for lifting magnets, the prime advantage inside the foundry being the elimination of the labor necessary to place sling chains around loads and the time necessary to do this, especially on heavy work. Magnets can be installed with weight lifting capacities from a few hundred to as high as 65,000 lb. Such an installation will replace 10 or 12 men. The saving of one man on a foundry operation can be set at approximately \$1,300 to \$2,600 a year. This is based on an average wage rate of 40c. for a laborer and 75c. for a skilled man.

Savings Due to Tractor Trucks

The value of using portable cranes with a single-line grab bucket was emphasized by Mr. Walton. With well laid concrete floors around yards and in the foundry, a large amount of work can be done with a tractor crane that for some classes of jobs is preferable to the use of an overhead traveling crane. In old-style foundries, the tractor crane is invaluable. He cited savings in detail from using tractor trucks.

For foundries having low head room and for others where molders' floors are located in irregular areas instead of in straight-away runs, and also where the work is light in weight, it often is preferable to use monorails or tramrails for handling materials, stated Mr. Walton. Such equipment, when properly placed, will reduce labor costs at least 75 to 85 per cent.

Charging Cupolas Mechanically Means Savings

Mechanical means of charging cupolas and of unloading raw materials were described by Mr. Walton, who cited the following examples of economies realized by certain foundries:

1. Charging an 84-in. cupola with 147 gross tons of metal per day and with coke and limestone at a total cost of \$17.86 per day, or 12 1/7c. per ton charged.
2. Making up and charging 175 tons per day, one man on charging floor, one on elevator, one on transfer car and four in yard making up charges, a total for labor of seven men—\$28 per day or 16c. per ton handled.

In conveyor table mechanism it is desirable to see that slides and other wearing surfaces are made of highest iron, with the most efficient wearing factors. In case of space limitations, it often is a problem to locate the cleaning room properly. In one foundry, described by Mr. Walton, a cleaning room was dug beneath the foundry floor and sand reclaiming equipment also was placed in the basement.

Equipment Should Be Standardized

Mr. Walton recommended that foundrymen standardize their materials handling equipment as much as possible. The benefits derived from standardization often are worth far in excess of the few dollars saved in buying a piece of equipment of different make because it is a little cheaper. He urged daily inspection of such equipment.

Natural Molding Sand Soon Obsolete

Economies derived from the mechanical handling of sand were described by Mr. Walton. Sand costs can be reduced from 20 to 50 per cent by properly designed and installed sand-preparing and bonding units. "Much has been written on this sand renewing proposition, but it

is no longer an experiment. Its adoption by any fair-sized foundry is a decided economy and within the next few years this method will be so standardized, both for grain size and percentage of bonding material and other factors, that natural molding sands will tend to become obsolete and too costly to find a market. One of the largest molding sand producers in the eastern States possessing this vision is well on the way in developing a method of bonding silica sand for molding purposes and in a manner that will meet specifications consistently on all shipments from his shipping point."

By no means the least important of foundry handling problems is the elimination of dust from tumbling

barrels, grinders, sand blast apparatus and the atmosphere of the foundry in general, said the author.

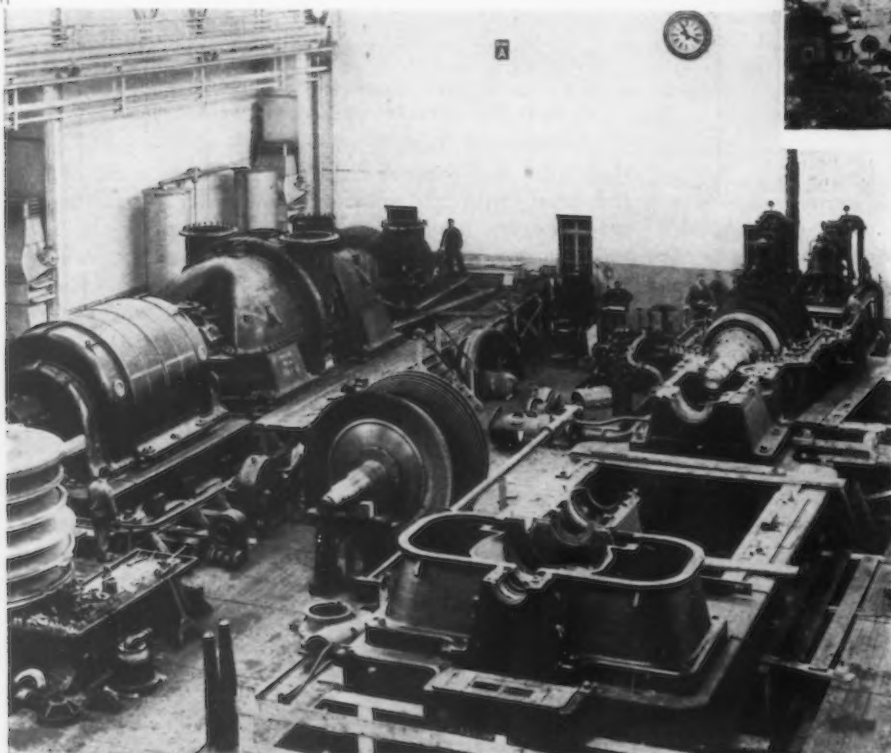
Benefits of Mechanical Handling

In discussing the benefits of handling materials mechanically, Mr. Walton said:

If you can reduce your payroll for handling by 10 men, you cut your payroll approximately \$12,000 per year, that is 6 per cent on an investment of \$200,000, and such a reduction gives you ample opportunity to install modern equipment at reasonable cost. Also remember, that by so doing you are going to improve conditions throughout your entire plant. Simplicity and ease in handling heavy flasks, in pouring molten metal and in subsequently cleaning up the foundry floors, will be re-

Manufacturing Electrical

BBROWN-BOVERI'S entrée to the American field of electrical equipment manufacture a few years ago by the formation of the American Brown-Boveri Electrical Corporation lends interest to the accompanying views of the parent plant at Baden, Switzerland. Started 37 years ago by C. E. L. Brown and W. Boveri, young engineers who had the imagination to see that the electrical industry offered great opportunities, the Brown-Boveri works in Baden has grown to one of the largest mechanical plants in Europe. Branch plants have been established at Münchenstein in Switzerland (formerly the Alioth Electrical Works); at Mannheim, Germany; Le Bourget, Le Havre and Lyons, France; Milan, Italy; Oslo, Norway; Vienna, Austria; Budapest, Hungary; Zychlin, Poland; Drasow, Czechoslovakia, in addition to the American works in which the Brown-Boveri Co. of Switzerland has a large interest. The combined European plants employ 40,000 men. All plants use identical designs. The illustration at the right is of the Baden works.



INSTANCES arise where the American Brown-Boveri Electrical Corporation draws upon the Baden plant for equipment. Such was the case in filling an order for a large electrical generating unit for the Hell Gate station, New York. One of 160,000-kw. units was built at the Brown-Boveri works in Baden and the other was furnished by the Westinghouse Electric & Mfg. Co. The view at the left shows the erecting shop of the Baden works, with the Hell Gate high-pressure turbine and a turbo-generator for Edinburgh,

flected in a better satisfied body of workmen, both skilled and unskilled, and this again in reduced costs. In fact, in our visits to scores of foundries we have often heard serious criticisms of certain other foundries, because they took business at less than cost to the other fellow, and more than once we have had an opportunity later to find that the low-priced foundryman was making money because he had saved it in his various handling operations.

Views of Various Foundrymen

In the discussion which followed, J. H. Hough, Mathews Conveyor Co., Ellwood City, Pa., stated that wooden bottom boards in connection with gravity roller conveyors are preferable to metallic in handling molds up

to 100 lb. Another speaker declared that runouts are more damaging to wooden bottom boards than to metal, but the latter are heavier to handle. Mr. Linabury stated that the disposal of waste material often is a serious matter and cited the fact that at one foundry refuse sand is put in a concrete pit and mixed with water, a sand sucker then being used to carry the sand to low land nearby, where it is deposited.

D. B. Hill, Jr., suggested that several additions might well be made to Mr. Walton's list of 17 operations in handling materials in the modern gray iron foundry. Operation No. 11, which included delivery of castings to cleaning room, to tumbling barrels and to sand blast

Machinery in Switzerland



phase transformers coupled together had been used for this purpose. Work has also been begun on two 3-phase transformers, each 65,000 kva., for a plant in Italy.

Higher temperatures and pressure in turbine work may be expected, it is stated, as a result of developments by the company's engineers. High-pressure boilers have been designed and built in connection with the experiments that have been made. In the development of combined heating and power production, the Brown-Boveri Co. states that the cost of high-pressure steam plants is very little more than that of low-pressure plants. There is no condenser and the steam at high pressure is first expanded in a primary turbine before being used again for heating the boiler feed water and, eventually, in a standard low-pressure turbine. With coal at 40 francs (about \$7.70) per ton in Switzerland one kilowatt-hour can be produced, it is said, for a fuel cost of 0.6 centimes.

Scotland, in process of erection. Practically all of the materials used at the Baden works are imported. Steel forgings, for example, come from Witkowitz, Moravia.

IN its transformer department, shown at the right, the Brown-Boveri Co. has undertaken the building of three 36,000 kva. 3-phase units for 252,000 volts on the high tension and 11,000 volts on the low tension side. These are thought to be the first transformers for 250 kva. to be insulated from earth. Up to a short time ago three single-



machinery, might be broadened by adding the cooling of castings during the period of travel from shakeout to tumbling mills. As the system is applied in several automobile foundries, the castings are picked up at the shakeout, either singly or in perforated buckets or containers, by an overhead trolley conveyor. The conveyor is designed so as to leave the foundry building proper, traveling underneath a cooling shed which permits the castings to be exposed to the air as much as possible. The course of travel can be as long as required to cool the castings to the desired temperature for handling. Castings with a large quantity of coarse sand are conveyed to the knockout building, where the coarse sand is removed and recovered, together with wires, gaggers, etc. Castings then are sent to the cleaning room, where they are unloaded on a section of the gravity conveyor located in front of the tumbling mills.

Operation No. 18, suggested by Mr. Hill, consists of handling cores through the core ovens. The use of continuous core ovens in recent years has cut core room costs considerably and has increased production in the same floor space. These ovens also have eliminated expensive lift trucks and core racks and have reduced breakage of cores from rough handling. Cores are better baked because of proper baking time and because of continuous movement through the ovens. They are received at the discharge end of the oven at a temperature which permits their being handled. Conveyors covering this type of work may be extended past the confines of the ovens, serving the core makers in a manner that cuts down unnecessary motions in loading cores. A feature of the system is the sloping of the conveyors as they pass along the line of core makers, permitting top and bottom shelves to be loaded with equal ease.

Pump Shaft Hardened With Nitrogen

Detroit Automobile Manufacturer Finds New Case Hardening Process Can Replace Stainless Steel Part

NITRIDING a special alloy steel for automobile parts has been started on a production basis by one of the leading Detroit motor car manufacturers. Several other automobile makers in Detroit and elsewhere are experimenting in this direction, and a Cleveland manufacturer of gas-engine valves for automobiles and airplanes has installed a furnace preparatory to getting on a production basis.

The part to be nitrided in quantities by the Detroit automobile manufacturer first mentioned is a water pump shaft, to be used in models to be brought out later in the year. This shaft heretofore has been made of stainless steel with 12 to 14 per cent chromium. A grade of Nitalloy* is now being used having the following chemical analysis: carbon 0.36 per cent, manganese 0.51 per cent, silicon 0.27 per cent, aluminum 1.23 per cent, chromium 1.49 per cent, sulphur 0.010 per cent, phosphorus 0.013 per cent, molybdenum 0.18 per cent. The shafts are made of bar stock 5 in. long and 41/64 in. diameter, and nitrided in a "Homo" electric furnace (Leeds & Northrup Co.) remodeled for this work. As regularly designed, hot air is circulated in this furnace through the parts being heat treated by a fan in the bottom. In the new process 90 liters of ammonia is taken in per hour at the top of the furnace and forced through in place of the hot air, the heat being conveyed in the gas.

As used for nitriding the furnace is provided with an air jacket around the outside through which compressed air is forced to cool the work rapidly after nitriding. There is also an oil seal at the top of the furnace to prevent the escape of gas.

In operation, while it is important to have the proper gas supply (and the ammonia is introduced at a measured rate), the gas pressure is not an important factor. A certain amount of the ammonia bleeds off and goes into an exhaust. The chemical reactions in the hot furnace are such that the gas breaks down into hydrogen and nitrogen, the latter being absorbed by the steel, and the hydrogen continues in circulation with surplus ammonia until it exhausts through the vents. For checking the rate of reaction, the escaping gas is passed through a pipette, where the ammonia is absorbed in water, leaving a volume

of hydrogen to be read directly on the graduated pipette. If the pipette shows an excess amount of hydrogen, the input of fresh ammonia gas is increased.

The furnace is filled with a loose pile of shafts, sealed, the gas flow started, the heat raised to 975 deg. Fahr., and kept for 21 hr. The case formed in that time is approximately 0.008 in. thick with a Brinell hardness of about 900. Hardness varies somewhat; some measurements indicate as high as 1000 Brinell. The work comes from the furnace with a silver white finish. The metal grows about 0.001 in. over size while in the furnace, and the size is reduced by putting the parts through a centerless grinder. This refinement may be avoided later.

It is stated that pump shafts made in this way cost about half as much as those of stainless steel, on the basis of 12 to 15c. per lb. for small quantities of Nitalloy and 20 to 30c. per lb. for the stainless steel. The same company is experimenting with the nitriding process for other automobile parts. It is regarded particularly applicable for parts demanding excessive hardness or a very low coefficient of friction, such as sectors and worms for steering mechanism and for valves.



Aluminum Coating Resists Corrosion

Aluminum coated duralumin has been found to be much superior to uncoated duralumin in resistance to corrosion in tests undertaken by United States Bureau of Standards. The corrosive attack on plain duralumin sheet was found to be increased by static tension, although the increase over the attack on comparison unstressed material was not sufficient to cause any great anxiety if the service conditions are mild enough to warrant consideration of the use of the plain duralumin. The attack on aluminum-coated duralumin sheet, however, was found to be entirely negligible even with severely corrosive conditions.

Corrosion accompanied by repeated bending stresses in a device appropriately dubbed a "wobble machine" was found to constitute a very searching test. Even here, however, the behavior of the aluminum-coated duralumin was so much better than that of the plain duralumin as to leave no uncertainty as to the superiority of this type of material for purposes where high strength, lightness and corrosion resistance are required.

*Nitalloy is the trade name of steels of special analysis used for nitrogen hardening by methods patented by Krupp (German).

Dies Used in Forging by Machines

Matter of Design an Important Factor—Necessary Draft in the Piece—Allowance for Shrinkage

BY HOLLOWAY KILBORN*

A SET of tools known as forging dies is used for forging with the drop hammer. Forging dies, always used in pairs, consist of blocks of steel varying in size from as low as 3-in. cubes up to those whose dimensions may be several feet. The dies are generally made of open-hearth or crucible steel, either so-called simple steel or alloy, including high-speed steel.

They may be in the annealed condition when the die-maker works on them, and hardened afterward, or they may be partially hard and used in the hammer without further heat treatment. The dies are so cut or dug out that, when the two cut-out surfaces are put face to face, the combined cut-out portions of both die blocks is the same shape as the forging which they are designed to produce (see Fig. 6). One of the dies is solidly fastened to the base, while the other is fastened to the lower end of the ram.

Holding the Die in Place

The method generally used to fasten the dies is by a dovetail joint (Fig. 7). The tongue is narrower than the groove, to allow for a key with a very slight taper to be driven alongside the tongue. Because a drop hammer base is very heavy and expensive to handle, an auxiliary base or shoe is generally interposed between the base and the lower die. This shoe remains in place until such time as it is necessary to redress the groove of the shoe, due to the wear caused by the frequent insertion of the key of the lower die. This saves almost all of the wear on the groove in the base. At long intervals, when it becomes necessary to redress the base, use may be made of portable shapers.

The overhead mechanism of a drop hammer is automatic, so that the hammer travels to the top of its stroke and is released, which causes one of the blocks to strike against the other, after which the ram is instantly raised again. The operation of drop forging consists of heating any suitable metal to make it malleable, placing it on the lower die block and allowing the upper die block to fall on it repeatedly. The weight of that block, backed up by the weight of the ram, forces the metal into the proper shape as defined by the impression or cut-out portion of the dies.

Making drop forgings is divided into two parts: first, making of the dies, and, second, production of the forgings.

Limitations in Design of Dies

IN making the dies it must be considered that it is not possible to forge all shapes. Consider a handful of snow, putty, butter or other pasty material, with the cupped left hand representing the lower die and the cupped right hand representing the upper die. By repeated blows of bringing the hands together the material will be forced into the shape represented by the hollow inclosed between the two hands.

*Treasurer, Kilborn & Bishop Co., New Haven, Conn. In THE IRON AGE of April 11, Mr. Kilborn discussed the principles of machine forging. In a third article he will cover the operation of forging equipment.

If a pencil or stick be held between the fingers of the right hand, so that the point will go down into the material, it will make a hole. A hole on the bottom side could likewise be made with a pencil between the fingers of the left hand. It may be readily appreciated, however, that it would be impossible to put a hole into the side of the material in this manner. In other words, it may be said that, as a first approximation to the law of forging shapes, any depression in a drop forging must in general have its

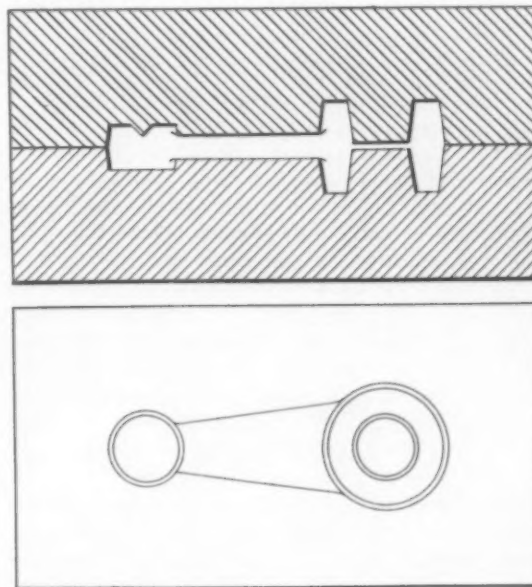


Fig. 6—Section Through Upper and Lower Dies of a Matched Pair (Top) and Plan of the Lower Die (Bottom)

sides parallel with the direction of travel of the upper die or ram.

Consider further that the pencil has an eraser on the end, and that the eraser is larger in diameter than the end of the pencil. In this case the eraser would make the hole and that hole would be the size of the eraser throughout its depth. This modifies the law of shapes to this, that no hole or depression in a drop forging may be larger at the bottom than at the top, although it may be smaller. In practice it must be slightly smaller by an amount equal to the draft, which is the angle on the side of every depression.

Draft Needed for Withdrawing the Piece

To illustrate draft and its necessity consider forcing a plastic material into a hole which is of uniform diameter throughout its depth. If an attempt be made to withdraw the material, or to obtain a cylinder of material the same size as the hole, the material would stick to the sides of the hole with sufficient friction either to break or make it impossible to withdraw it. If, however, this were done in a tapered hole, such as represented by the inside

of a sewing thimble, the material could be withdrawn, leaving a tapered shape the same as the inside of the thimble.

This illustrates the general law of forging shapes, which may be expressed as follows: No surface of a drop forging may be parallel to the path of travel of the dies, but must depart from parallelism by an amount not less than the draft angle, and in the direction which will make all parts of the forging smaller at the bottom of the impression in each die than at the top. The usual draft angle in drop forging is 7 deg. This is not an inflexible value and in some cases it may be reduced even to zero on one side of a forging, by allowing double draft on the other.

The size bar used in making a forging will generally be smaller than the width of the forging and when the

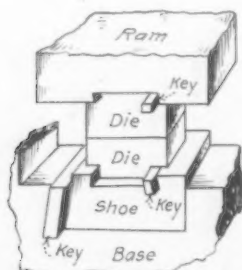


Fig. 7 — Illustrating the Method of Attaching the Dies to the Ram and the Base, with Shoe to Take the Wear on the Latter

metal is pounded it is forced sideways, or "flows." This presents no problem unless there is some projection in the impression of the die which prevents its free movement.

To illustrate this, consider a slanting board with a protruding nail head, and that cold molasses is poured down the board. The nail will separate the stream of molasses, which will unite again below the nail. In forging, the continued hammering would force the molasses (or steel) tightly around the nail but unless perfect welding occurs there would be left a crack or "cold shut" where the two streams were forced together below the nail. The flow of metal in forging is very much like the flow of cold molasses or very heavy oil, except that in forging the flow occurs in jumps at every blow of the hammer. When a stream is separated it is poor practice to try to unite it if it is possible to avoid doing so.

Chilling must be considered. In forging a shape like an orange with a knife blade projecting from the surface, the blade portion would cool very rapidly compared with the larger bulk, giving rise to difficulties both of keeping the entire forging hot and of holding the dimensions after cooling.

The die design is influenced by the quantity which is to be made at one setting of the dies, as well as by the quantity eventually wanted. Dies may be so designed as to make two or more forgings at once, which are later cut apart by trimming.

Dies are made from either models or drawings. Often a very slight change, which would seem insignificant to the layman, will be of the greatest importance to the die maker and might even be impossible to accomplish.

Allowance for Shrinkage of Forging

Since metal is forged while hot, but is subsequently used while cold, and it shrinks in cooling, that fact must be allowed for when making dies. All forging dies are made larger than the size which the piece is to be when cold, by an amount equal to the shrinkage. The die maker uses a "shrink rule" which, in the case of steel forgings, is longer than the standard rule at the rate of 3/16 in. to the foot, or 1½ per cent. This is the amount which steel shrinks from forging heat to room temperature.

Other metals shrink at different rates, but unless extreme accuracy is required the difference of rates is negligible and the same dies may be used for forging the same piece of different materials. The last blow on a

forging may be taken at full heat or at a lower heat, which will however appreciably vary the dimensions of the forging when cold.

After all points in connection with the design, material and specifications are considered, the die maker lays out the design on the surface of the two die blocks, and then proceeds with hand tools or machines to cut the impressions into the blocks to make the required shape. This cut consists of several parts or stages, all designed to the end that the final or finishing stage or impression may leave the forging exactly as wanted.

The die maker uses a large variety of tools, such as dividers, gages, standard and shrink scales, protractors, micrometers, scrapers, chisels, etc., also several machines, the most important being a "die-sinking machine," which is a vertical-spindle milling machine with a universal bed, on which the die block may be fastened and moved in any way against different shaped cutters revolving in the spindle of the machine.

Usually the finishing impression is made first. After it is completed, the two die blocks are placed face to face and melted lead is poured into the impression and allowed to harden. As the shrinkage of lead from its freezing temperature to room temperature is very close to the shrinkage of steel from forging to room temperature, the "lead cast" shows the same shape and size as the cold forging, unless the lead is prevented from shrinking by projections in the impression. If this lead cast is correct, the dies are hardened (not always necessary, depending on the die block material), then the faces are accurately ground flat and they are ready for the drop hammer.

There is no definite quantity of forgings which one pair of dies will produce. It varies with the shape of the piece, with the material, with the design of the dies, with the manner in which they are used by the forging operator, and with the specifications imposed on size and surface conditions. It will vary from perhaps 100 pieces under the worst conditions to as many as 500,000 under the best, the normal life for steel pieces being between 10,000 and 40,000.

Metal Coatings for Wood and Fabric

Europeans are giving considerable attention to the so-called Einstein process of electroplating wood, fabric and other poor conductors of electricity. While the details of operation have not been published, it apparently depends upon two principles long known: first, coating the material with a conductor like carbon dust, and, second, keeping the articles to be plated or the bath in motion.

Aircraft products examined by C. E. Larard of the Northampton Polytechnic, London, included metallized wood struts, fabric and propellers. The compressive strength of the strut was increased 65 per cent and the modulus of elasticity 50 per cent, and it was practically waterproofed. Metallized fabric has its tensile strength doubled. The propeller withstood high-velocity operation, and did not splinter when struck by a bullet. The propeller had a copper undercoat and a chromium finish, the combination being 0.8 mm. thick at the hub and 0.4 mm. thick at the tips.

Engineering reports that such materials as wood, asbestos, silk, porcelain and paper have been covered with non-corrosive metal layers; copper coating so thin that the grain of polished wood shows through has been used.

Equipment for thermomagnetic analysis is described by R. L. Sanford in Bureau of Standards Research Paper No. 50. Special attention is given by the author to the adjustments and precautions necessary for screening the equipment from outside effects, induced by moving elevators, electric motors or lighting circuits. An outline of the experimental procedure and some results are given.

Electrically Heated Rotary Carburizer

Two-Point Control Gives Uniform Temperature in Cylinder, a Rapid, Uniform Penetration in Carbon and Economizes Labor and Material

BY H. M. CHATTO*

AN electric rotary carburizing furnace recently installed by the Claremont, N. H., plant of the Sullivan Machinery Co. is shown in an accompanying illustration, and was built by the W. S. Rockwell Co. of New York.

The installation consists of a rotating alloy cylinder inside an electrically heated, automatically controlled, box-shaped furnace chamber. The heating units comprise three windings of the ribbon type operating on a 220-volt, 3-phase circuit, and having a connected load of 72 kw. A standard automatic control panel is used in conjunction with a Leeds & Northrup two-point recorder controller. One thermocouple is placed in the furnace chamber with the sensitive end near the winding and the other is placed inside the revolving crucible. An ingenious collector ring and brush mechanism makes electric connection between the thermocouple and the control panel. The furnace is mounted on trunnions, which allow it to tilt sufficiently to dump the charge by gravity. A handwheel, coupled to the furnace shell by a train of gears, provides easy tilting.

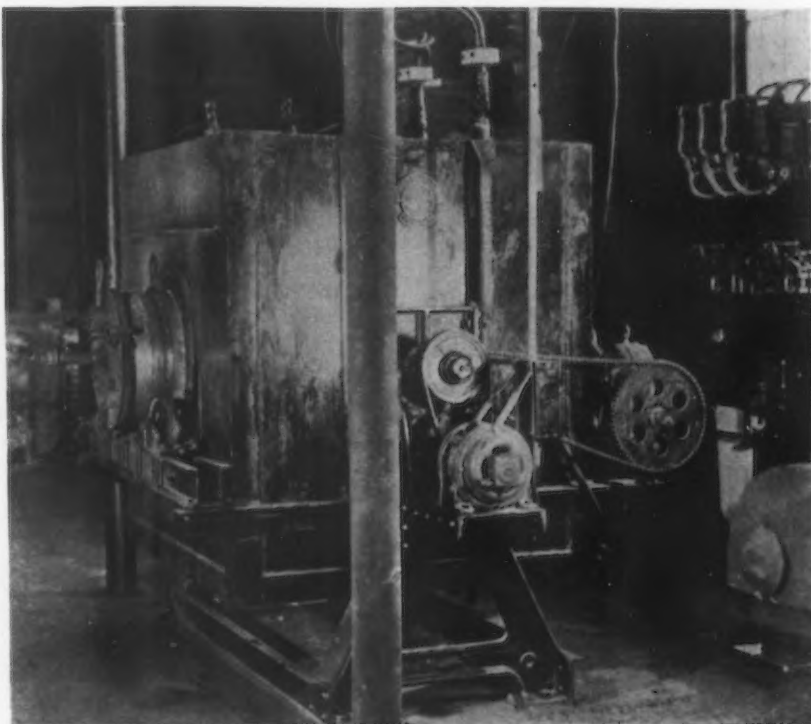
A motor, mounted on the rear side of the furnace, is connected by chain drives and gear reduction to a sprocket on the rear end of the cylinder, turning it about two times per minute.

About 500 lb. of forgings, each

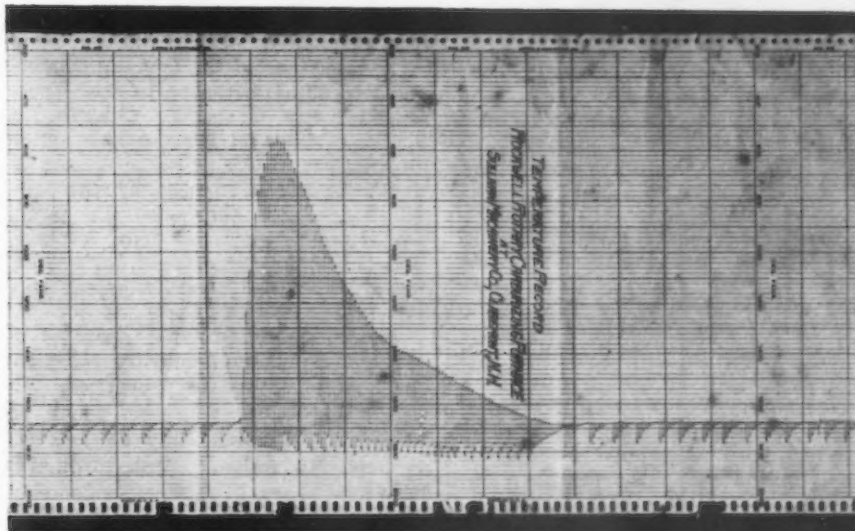
about 6 in. long overall and weighing about 1.5 lb., are shoveled from the floor into the open end of the cylinder. A weighed amount of carburizing compound is then shoveled in. This is done (with the furnace up to temperature) in so short a

time that very little smoke of burning carburizing compound gets into the room.

A temperature chart, working on two-point control, shows the time for heating such a charge to be 1 hr. 40 min. It also shows that the heat-



Rotary Carburizing Furnace Tilts Forward to Discharge Work at Completion of Run. Electrical control on panel at rear



Temperature Record Showing Short Heating Period Without Overheating Electrical Resistors (upper points) and Uniform Temperature at Center of Cylinder (lower points)

ing elements periodically jump about 80 deg., but these fluctuations (to take care of radiation and absorption) cause little or no difference at the center of the cylinder. During the first 20 min. fumes discharge around the end door directly into the air. Although a valve is provided for this purpose, the leakage around the cover serves to relieve the pressure of the carburizing gas.

The charge is dumped by stopping the motor and tilting the furnace on its trunnions by means of the hand wheel. It first strikes a screen, which separates the charred carburizing compound from the work. A water quenching tank located directly in front of the furnace and below the floor line receives the pot forgings as they slide off the end of the screen.

With the 72 kw. rating, the time of heating to carburizing temperature is from 1.5 to 3.25 hr. under normal conditions—that is, where the fur-

* General Electric Co., Boston.

nace is in steady service. The length of holding time is, of course, dependent upon the depth of the case, the nature of the compound used, the metal and the temperature, but the total overall time is always several hours less than that required to heat up cold boxes and their contents. This is because there is no time lost waiting for the boxes themselves to heat up. Secondly, the material itself is constantly changing in position, so there is not the time lag in getting heat through to the center of a mass. Thirdly, again because of the rotation, the carburizing action is very uniform throughout the entire mass.

The Sullivan Machinery Co. finds that the furnace's best application is in handling large quantities of identical small parts, because no labor is required for packing the work in boxes. On such small work there is generally a considerable variation in

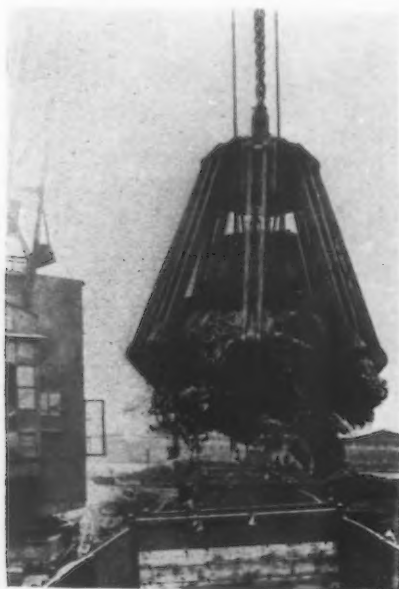
the depth of case between work on the outside and inside of a box, while in this furnace the carburizing action is uniform.

Small forgings can be given a 1/32-in. case at 1680 deg. Fahr. in 6½ hr. at the rate of 3.1 lb. net per kwhr. The radiation loss at this temperature is approximately 17 kwhr.

For work that can be tumbled, the labor is about 40 per cent of that required when using pot and box type furnaces. The furnace, according to estimates by the user, will save about \$5,000 a year on the costs of pots and repairs otherwise necessary. Working conditions are also found to be better. Other advantages are that this method does not require as much carburizing compound by about 40 per cent; the floor space is less than for the box type furnace of similar capacity, and the work is strictly uniform.

Bucket for Unloading Steel Scrap or Ore

A RADICAL departure from previous designs of buckets for handling loose materials is represented by the Polyp bucket, manufactured by Reichmann-Becker Polyp Co., Duis-



One Form of Blade Is Adapted Particularly to Grabbing Loose or Baled Light Steel Scrap

burg, Germany. As is indicated by the illustrations, the Polyp may be termed a multiple flexible-blade bucket, the blades being not rigidly connected with one another, but operating independently. The blades adjust themselves to the material to be handled, and dig in like so many fingers of a hand.

The Polyp is built in two types. The open type, with eight blades, is used for handling steel scrap of every kind and other sparry material, while the closed type is designed for handling ore, coal, coke, gravel, sand,

stone, for excavation work, dredging, well digging, etc.

One of the principal advantages is that the Polyp will be fully loaded with each lift, which results in a greatly increased efficiency of the plant, as less labor need be employed and the material will be handled in less time. The bucket is built up to a capacity of 20 cu. yd. Although it has been on the market but a few years,



For Hoisting Ore or Coal the Blade Is of a Form Somewhat Different from That for Scrap

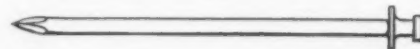
numerous units are now in use all over Europe. Patents have been granted, while others are pending.

Koppers Construction Co., Union Trust Building, Pittsburgh, has moved its offices to the Koppers Building, at Grant Street and Seventh Avenue.

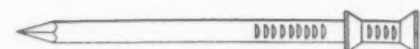
Patent Rights on a Double-Head Nail

ACQUISITION by the American Steel Co., Park Building, Pittsburgh, of patent rights for a double-head nail invented by Ralph E. Mehlman, has been announced. Mr. Mehlman, under date of March 12, was granted a patent on the ground of priority of invention over G. C. Fedderman and Herbert Appleby, who also applied for a patent.

The American Steel Co. is incorporated under New Jersey laws. Its



Two Forms of Double-Head Nail, That at Top Being the Mehlman Patent, While the Lower One Is the Appleby Nail



predecessor of the same name, incorporated under the laws of Pennsylvania, sponsored the Appleby patent application. The new company in acquiring the Mehlman patent has included with it the Appleby claim.

Companies which have been manufacturing the double-head nail are being informed by the American Steel Co. that "nails manufactured prior to March 12 and embodying the patented features are free of accounting to the patentee or his assigns; but, after that date, are bound by the usual patent regulation."

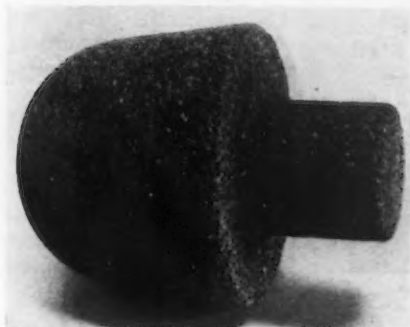
Magnetic Probe to Remove Particles from Eyes

REMOVAL of iron and steel particles from the eyes and flesh of workmen has been considerably facilitated by the development of a new magnetic instrument manufactured by V. Mueller & Co., Chicago, and marketed under the name Magneprobe. The instrument, which was developed at the instance of the first aid department at the Hawthorne works, Western Electric Co., Inc., Chicago, is really a powerful permanent magnet in the form of a surgical probe and is about the size of an ordinary lead pencil. One end is sharpened to a point for removing particles from the eye and the other is flattened for use in cases where the steel fragment has penetrated into the flesh.

The magnetic probe is made of a type of Honda high-cobalt steel with pronounced magnetic properties. It has a high coercive force, which is obtained with practically no loss of residual induction. With ordinary care the probe will retain its magnetic strength indefinitely. As it is made of rust-resisting steel and is not plated, it may be sterilized repeatedly by boiling.

Carborundum Reamer for Teeming Nozzles

AN abrasive tool of interest to the steel and metal producing industries is the Carborundum ladle nozzle reamer shown in the accompanying illustration. These reamers are used for reaming out fire clay nozzles, to get a close fit between nozzle and stopper head. The reamer is rotated



Use of This Reamer Avoids Leaky Nozzles

in the clay nozzle with a carpenter's brace until the desired smoothness and a snug fit is obtained. Troubles from leaky stoppers thus can be eliminated.

In some steel plants, the stopper head itself is used for reaming, but this produces small fractures, and the stopper head frequently cracks when in contact with the metal. This is particularly true when metal of high temperature is being handled. Abrasive reamers are made of coarse grit Carborundum by the vitrified process. They come in any desired size or shape.

Files for Foundry Core Marks

CONSIDERABLE demand has come from the foundry industry for a durable file to smooth off seam marks from sand cores after coming from the molds. An ordinary steel file or rasp has been generally used, but the core sand is so abrasive that these tools wear out very quickly. To correct this situation the Carborundum Co., Niagara Falls, N. Y., has introduced an abrasive file composed of Carborundum grains bonded with Redmanol.

Carborundum Brand Redmanol core files are made in three overall lengths: 8½, 10½ and 12 in. respectively. They are of the half round tapered shape with a steel rod running lengthwise through them. Since they are used chiefly on jacket cores, the end of the steel rod protruding from the butt end is useful for punching holes in cores.

Because of their fast and free cutting action, it is claimed that considerable reduction in file expense can

be effected by using abrasive files and that the time required for filing is materially lessened.

Electric Pouring Equipment

A NEW electrically operated pouring unit for foundry use is being placed on the market by the Modern Pouring Device Co., Port Washington, Wis. Controlled by switch button on the end of the steadying lever, the ladle may be raised or lowered quickly and with minimum effort. This per-



The Rigid Framework Eliminates Swaying, but the Structure Is Arranged to Rotate Freely

mits one man to pour from ladles holding up to 1000 lb.

To eliminate swaying, the entire framework is rigid from the trolley to the ladle trunnions. The whole structure rotates freely on a ball-bearing thrust collar in the frame of the trolley. All movable parts operate on Timken roller bearings in a continuous oil bath. As the current

is taken from collectors, there are no cords to interfere with swiveling.

Entire steel construction makes the machine compact and light, for easy moving from mold to mold. It is furnished with a ball-bearing trolley adaptable to the I-beam size. The vertical operating speed is 8 ft. a minute, which permits accurate adjustment of height. The working parts are inclosed in dust-proof housings. Positive upper and lower limit switches guard the hoisting mechanism.

Scale to Count Small Parts by Weight

A SCALE designed especially for small parts counting, with a capacity up to 40 lb. and yet with such sensitivity that a single paperclip or tiny screw will move the indicator, is offered by The Toledo Scale Co., Toledo, Ohio. Sensitivity has been combined with automatic dial indication in a ratio scale especially made for small parts.

Pendulum mechanism and self-aligning bearing are employed. Of the bench type, the scale is small and compact but with roomy scoops.

Fastened to the end of the extended ratio beam is a rod hooked to an auxiliary lever, from which two cup-shaped ratio pans are suspended. The right-hand pan has a ratio of 99 to 1, that is, with a balance when 1 part is in the right-hand pan, the count is 100. The left-hand pan has a ratio of 9 to 1, which means that one part in this pan counts 10 parts.

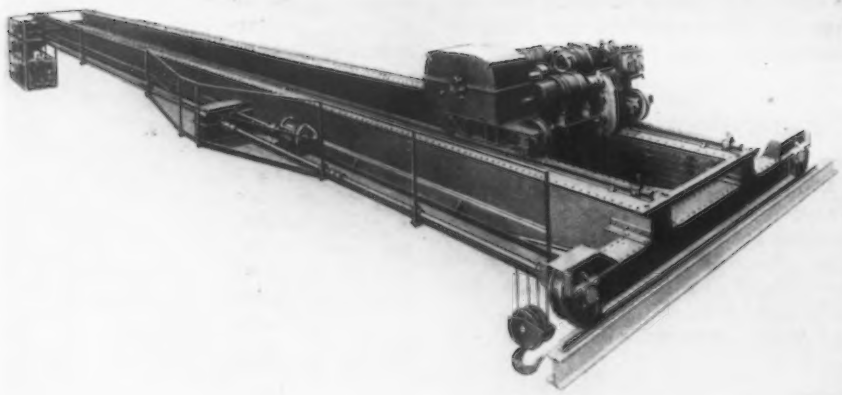
To count an unknown quantity, all the parts are put in the platform scoop. Parts taken from the scoop are now placed in the right-hand ratio pan until the indicator approaches zero. Then parts are put into the left-hand pan until the indicator touches zero. If the count is still not accurate, that is, if the indicator does not split zero, counting the odd parts out into the hand will give the number.

To arrive at a predetermined number, the procedure is to place the hundreds and tens numbers in the ratio pans and fill the platform scoop until the scale is balanced. That is, for 453 parts, four parts would go into the right-hand ratio pan, five into the left-hand or 9 to 1 pan, and then, after balancing, three parts would have to be added.

(At Right) One Part in Pan A Balances 9 Parts in the Platform Scoop. Similarly, one part in pan B balances 99 parts

(Below)—File Made of Carborundum Grains Bonded with Redmanol





New Crane Has Herringbone Gears

A PRINCIPAL feature of the "Tiger" crane, recently developed by Whiting Corporation, Harvey, Ill., is the use of herringbone gears. The smooth rolling action obtained results in quiet-running with reduced friction and lengthened gear life. Hyatt roller bearings were installed.

Lubrication is as nearly automatic as it can be made. The entire hoisting mechanism, including mechanical brake and drum gear, is inclosed in an oil-tight, welded steel casing. The whole unit operates in an oil bath, and all the bearings are inside of the housing. The track or trolley travel gearing is similarly inclosed and also operates in oil bath; likewise the bridge drive gearing. Axle and squaring shaft bearings are lubricated by a high-pressure grease gun.

All parts of the Tiger are machined to jigs and dies, making them interchangeable. The matter of safety has had prime consideration. A

broad footwalk with upturned sides extends from end to end on the driving side. All gears are inclosed, with the bearings inside the case. There are automatic brakes, an automatic limiting device to prevent overtravel of the hook, a fully inclosed switchboard with suitable locking device, rail guards for the wheels, etc.

By the use of herringbone gears, it has been possible to secure the necessary speeds with two gear reductions instead of the usual three. This means fewer wearing parts and a more compact trolley. The herringbone gears are cut from steel blanks, without grooves or center notch.

The structural members composing the trolley frame are welded together, forming a one-piece construction of minimum weight. The hoist gearing and mechanical brake are mounted on a steel casting, placed inside of the welded gear case and bolted to the trolley frame.

that serves to force the retainer into a curved groove in the body of the punch. This holding member acts as a prop, with the retaining feature equivalent to the head on an old fashioned shoulder punch. In designing the retainer a high factor of safety was allowed in order that the holding member would have ample strength to withstand heavy stripping strains.

Releasing of the punch simply involves lightly pressing the prop with an extractor, which permits the punch to drop out. The absence of wedging or binding action of the retainer permits the punch to be moved up or down easily, for lining the punch with the hole in the die, before being locked in position by the retaining member.

The punches are made in a wide range of sizes and shapes. The retainers are furnished in three different shapes that provide for a wide variety of methods of grouping holes.

Census Taken of Buying By Machinery Manufacturers

WASHINGTON, April 23.—Manufacturers of machinery in Cleveland and environs, with an individual annual production valued at \$100,000 or more, made aggregate purchases of \$61,550,065 in 1927, exclusive of transportation equipment, according to a preliminary report on a census of purchases and distribution conducted by the Department of Commerce with the assistance of the Cleveland Chamber of Commerce. Semi-finished products purchased were valued at \$50,596,488, or 82.20 per cent of the total. In this group of purchases brass and bronze amounted to \$6,765,988; castings, \$6,209,488; steel bars, angles, plates, sheets, etc., \$4,312,166; electrical machinery and appliances, \$4,032,045; electrical supplies, \$4,030,436; pig iron, \$8,481,116; wire and cable, \$1,795,209; scrap iron, \$1,643,877.

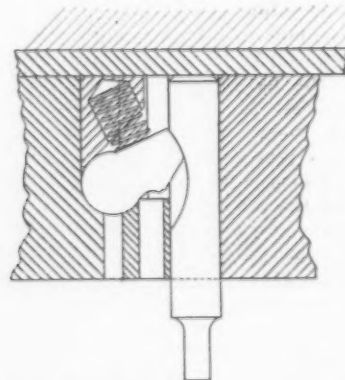
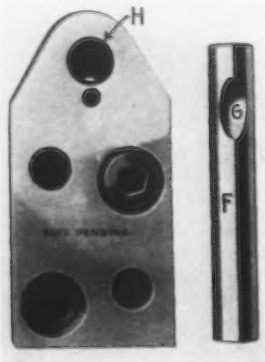
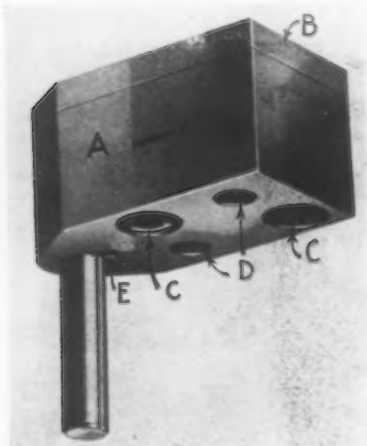
Establishments engaged primarily in ship and boat building and repairing reported for 1927 a combined output valued at \$211,127,067, an increase of 19.2 per cent as compared with \$177,181,960 reported for 1925, according to the Bureau of the Census.

Punch Retainer Facilitates Replacing Broken Tools

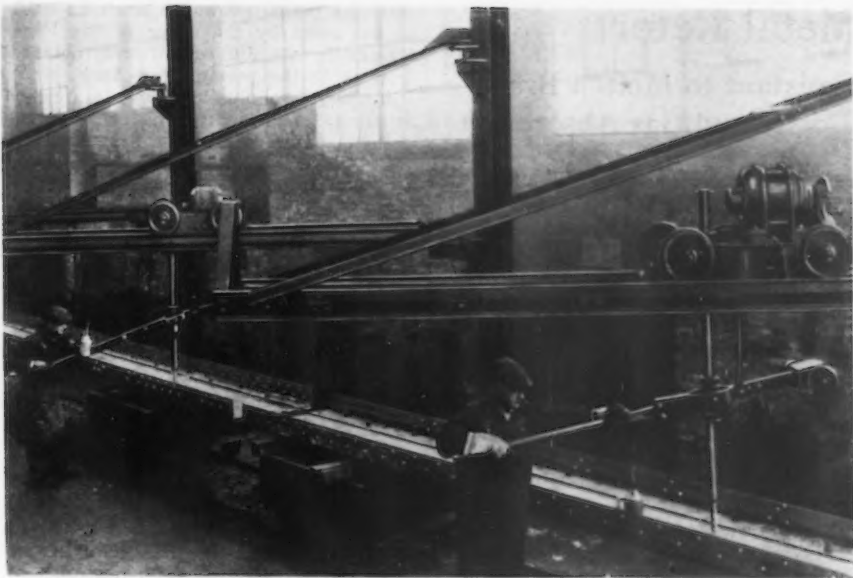
INTERCHANGEABLE punches and retainers, designed to permit convenient removal and replacement of broken punches without removing the die from the press, have been brought out by the King Works, 7350 St. Aubin Avenue, Detroit. These tools are for use in connection with piercing dies. It is stated that the punches

cannot upset and freeze, ease of releasing them is unaffected by stripping strains and that they may be interchanged with equal facility whether used on light or heavy gage material.

From the accompanying cross-section sketch it may be seen that the retaining member consists of a cam-prop and socket backed by a spring



A is the Punch Retainer, and B, the die shoe. The holes C are for fastening A to B; those at D are for guide pins and at E for the steel pin that releases the punch. The punch is shown at F, the groove to receive the prop at G, and the punch hole at H. The cross section view shows the arrangement of the punch and prop



Drilling and Reaming Unit for Structural Shops

FOR use in structural iron and steel fabricating shops the Lakeside Bridge & Steel Co., Milwaukee, is building the lever feed drilling, reaming and countersinking machine illustrated, the maximum drilling and reaming capacities of which are 1 in. and 1 1/4 in. respectively.

The drilling unit is mounted on trolley wheels that run on a horizontal structural steel arm which is supported in cast iron brackets as shown. The boom is made in six standard lengths from 10 to 20 ft., other lengths being made to order. Used as a radial drill the machine has wide range, and when not in use it may be readily swung out of the way.

A direct-connected direct or alternating current motor drives the spindle, the power being transmitted through spur and bevel gears. The bevel gears drive the main spindle and run in a bath of oil. On the standard machine three spindle speeds, 80, 115 and 170 r.p.m. are obtainable through change gears. The spindle has vertical movement of 11 in. and has a five-point adjustment which gives an additional 11-in. adjustment vertically. The machine can be furnished with a special vertical adjustment unit to adapt it for operating at different elevations, permitting continuous operation without moving the work. Variation in working height up to 28 in. can be secured with this device.

All gears and pinions, except the idler pinion, are of cast iron and have cut teeth. The idler pinion is made of rawhide with bronze side plates and bushing. The main spindle bearings are bronze bushed, all other bearings being babbitted. Shafts are of cold rolled steel. The spindle is bored for a No. 4 Morse taper shank. The feed lever is counterweighted, the counterweight being adjustable.

It is stated that a capable operator can drill 125 3/8-in. diameter holes through 5/8-in. steel and ream or countersink up to 300 holes per hour. A portable unit consisting of a base and column, and horizontal arm, with

or without the drilling machine, is also built by the company. The drilling machine adapted to the portable unit is equipped with a special quadrant that gives additional vertical adjustment of approximately 15 in. for working at different elevations.

Adds No. 2 Machine to Line of Standard Millers

THE Brown & Sharpe Mfg. Co., Providence, has added to its line of "standard" millers a No. 2 universal and a No. 2 plain machine, both of the cone drive type, for toolroom work and for light manufacturing.

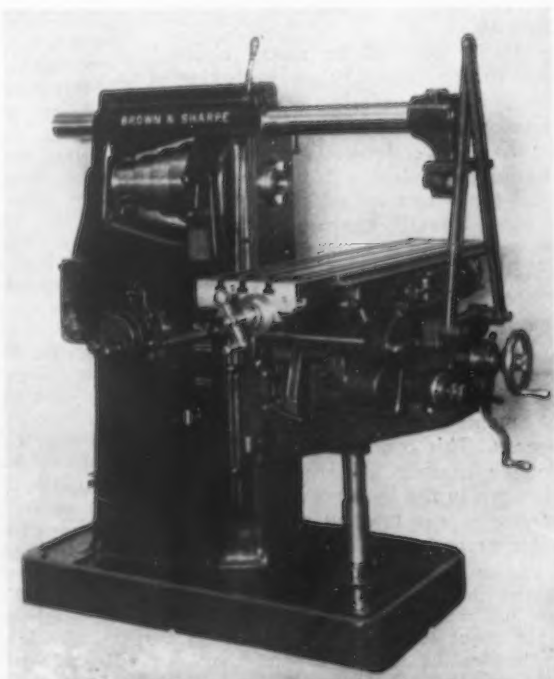
The cone pulleys are mounted on sleeves on the machine spindles. A fast and a slow series of spindle speeds are available, the slow series

being obtained through back gears that may be engaged conveniently by means of a lever on the left-hand side of the machine. Two operating positions are provided, one at the front and one at the rear of the table, and all control levers are within convenient reach from either position. Changes in the power feed of the table are made by rotating either the front or rear feed change levers one revolution to the right or left. The rate of feed engaged is shown on both of the direct reading dials, which are set at an angle to facilitate reading and are provided with glass windows to prevent clogging by chips and dirt. The knee elevating screw is of one piece to assure accuracy of vertical adjustment; it is entirely inclosed in a steel sleeve and does not extend below the base of the machine. Another operating convenience is the provision for clamping the overarm at two points by means of a single lever at the front of the column.

Filtered oil is supplied to all bearings within the column by means of a plunger pump. A gage on the side of the column indicates the pressure. Another pump automatically lubricates the knee mechanism, while a large well at the front of the saddle oils the entire saddle mechanism and the table bearings.

New price schedules applying to industrial steel windows have been announced by the Truscon Steel Co., Youngstown, in connection with the issuing of a series of booklets describing the Truscon line of industrial windows. The books cover Truscon pivoted windows for use in factory walls, continuous windows for roof monitors, and saw-tooth roofed buildings and Truscon projected steel windows of both the industrial and architectural types.

TWO Operating Positions Are Provided, One at the Front and One at the Rear of the Operating Table. Changes of power feed are made by rotating either forward or rear change lever one revolution



Melts Brass in Metal Retort

New Alloy Said to Be Highly Resistant to Molten Brass—Closed Retort Prevents Metal Losses and Gas Absorption

A METALLIC retort furnace for brass melting was described by Alexander Forward, managing director American Gas Association, at the annual convention of the Midwest Gas Association, Minneapolis, April 16. The metallic alloy was developed during a joint research by the association and the American Gas Furnace Co., Elizabeth, N. J., and one of the furnaces has been given an extended test by the Trenton Brass & Machine Co., Trenton, N. J., in the manufacture of plumbing fixtures.

The first retort made from this new alloy has served for more than 250 heats at temperatures greater than 2000 deg. Fahr., and is said to be none the worse for wear. The new brass smelter consists of a revolving metallic retort, externally fired with 10 gas burners and inclosed in a heavily insulated sheet steel drum. The entire furnace is mounted on two bearings so it may be tilted at any desired angle.

The commercial trial at the plant of the Trenton Brass & Machine Co. gave an opportunity to make comparisons. The lowest volatilization losses during melting had been between 5 and 6 per cent; each crucible when pulled from the furnace had to be

skimmed before it was taken to the pouring floor. These losses are now practically eliminated, it is emphasized, as the only loss with the closed metallic retort is during pouring. Collateral advantages are uniformity in chemical analysis of the castings, and easily machinable castings.

Fuel consumption is low: 2½ cu. ft. of gas per pound of brass melted; this is regarded as one of the principal achievements of the new furnace. Other economies include considerable labor saving from the faster heat transfer which reduces the melting time; this also assists in lowering the fuel requirements. Another fuel saving lies in the fact that the retort remains overnight at 800 deg. Fahr.

Copper Trading Rules for Metal Exchange

Offered for Adoption on April 29—Trading in Futures May Commence May 10

AT a special meeting of the board of governors of the National Metal Exchange, New York, a decision was reached to approve trading rules on copper futures. According to Erwin Vogelsang, president of the exchange, these rules will be submitted to the members for acceptance at a meeting on April 29. If favorable action follows it is planned to commence copper trading on or about May 10.

"It is believed in metal circles," said the president, "that the action of the board, in ordering copper futures listed for trading, will represent one of the most constructive influences in the copper industry." It is predicted that the consumer will be enabled to protect himself against violent price movements in a manner never before possible, and that the producer and customer will also benefit by price insurance.

The rules provide for the appointment of a committee on copper of five members, at least three of whom shall be members of the board of governors. This committee will supervise copper trading and recommend any changes in the by-laws and rules governing copper trading as it may consider necessary. Details follow:

The copper contract will be for 50,000 lb., which, at present prices (around 18c. per lb.), would make the value of a contract about \$9,000. Fluctuations will be in hundredths of a cent and the limit of fluctuations for any one day will be

2c. above or below the previous day's close. Trading will be confined to the current month and the 11 succeeding months.

Contract grades of copper will be prime electrolytic copper and prime Lake copper, assaying 99.90 per cent in ingots and/or bars and/or wire bars of standard weights and sizes. Discount grades will be best selected copper, assaying 99.80 per cent, casting copper, 99.50 per cent, and casting copper 99 per cent, in ingots and/or ingot bars. In addition the rules include as discount grades rough or blister copper in six grades, 94 to 98 per cent inclusive.

Prime electrolytic copper shall be deemed the contract grade, the seller having the option of delivering prime Lake copper at the contract price. The seller shall also have the option of delivering any one of the other grades above named at the following discounts from the contract price: Best selected copper, assaying 99.80 per cent, at ¼c. per lb.; casting copper, assaying 99.50 per cent, at ¼c. per lb.; casting copper, assaying 99 per cent, at ½c.; rough or blister copper, 98 per cent, at 1½c.; 97 per cent at 1¾c.; 96 per cent at 2c.; 95 per cent at 2½c.; and 94 per cent at 3c.

Prime electrolytic copper, Lake, best selected and casting copper shall be deliverable from licensed warehouse, but any of the officially listed brands may be delivered from the producing refinery or smelting plant, provided, however, that such refinery or smelting plant is located in New York, New Jersey, Maryland, Missouri or Pennsylvania. All other tenderable grades of copper shall be delivered only from licensed warehouse. When delivery is made from refinery or

smelting plant, allowance shall be made in the price by the seller to the buyer for the freight differential from point of delivery to the port of New York.

Minimum commissions are established at \$10 per contract for members of the exchange residing in the United States and Canada; double this rate applying on deals for non-members. For members and non-members living outside the United States and Canada an additional \$1 per contract is provided for. For each contract bought or sold by one member for another, giving up his principal on the day of the transaction, the floor brokerage shall be \$1.50.

All Automobile Production Records Broken

WASHINGTON, April 20.—Production of motor vehicles in both the United States and Canada established new records in March. Passenger car and truck output in the United States totaled 584,733 units, showing the remarkable increase of 109,360 units over the February record total of 475,373. Passenger car output was 513,266 units, exceeding the previous record of 414,740, established in February, by 98,526. Truck output was 69,559 units, an increase of 11,034 over the February production of 58,525 units. The previous record in truck production was in August, 1928, with a total of 60,705 units. Factory-built taxi-cabs to the number of 1908 were produced in March, against 2108 in February.

In Canada 40,621 passenger cars and trucks were produced in March, exceeding by 9334 the total of 31,287 produced in February. Passenger cars produced totaled 32,833, an increase of 7249 over the February output, and truck production was 7788 units, an increase of 2085 over 5703 produced in February.

Total production of motor vehicles in the United States during the first quarter was 1,460,801 units, against 968,838 for the corresponding period of last year, an increase of 491,963 units. Passenger car production was 1,275,053 units, against 868,618, an increase of 406,435, and truck output was 179,668, compared with 100,220, an increase of 79,448 trucks.

The best previous quarterly record was that of the third quarter of 1928, with 1,268,698 units (United States, only). Next best was the second quarter of 1925, with 1,251,540, followed by the second quarter of 1926, with 1,250,391 and the second quarter of 1928, with 1,232,683. The best previous first quarter was in 1926, with 1,108,194, followed by 1924, with 1,071,563.

Manganese Steel Forge Co., Philadelphia, manufacturer of rolled and forged manganese steel products, has established a sales office in Cleveland at 623 Union Trust Building. It is in charge of P. M. Hobbs, who has been connected with the sales departments of the company's main office and of the Chicago office.

Pros and Cons of Group Bonus Aired

Merits of Group as Opposed to Individual Incentive
Argued Before Taylor Society Section

THE relative merits of group and individual incentives were argued at a dinner meeting of the New York metropolitan section of the Taylor Society April 18. The principal speaker, Dr. C. C. Balderston, industrial research department, Wharton School of Finance and Commerce, Philadelphia, expressed a preference for the group bonus plan. Doubts concerning the superiority of the group incentive were voiced in formal discussions by Prof. Charles W. Lytle, director of industrial cooperation, New York University, and John W. Weller, manager, Barber Asphalt Co., Maurer, N. J. The attendance was large, totaling 85.

Dr. Balderston based his remarks on a survey that is only half done, and explained that his conclusions were, therefore, tentative, subject to possible revision. He has studied incentive plans in 50 plants in various parts of the country, is helping install group bonus plans in three Philadelphia companies and in the coming summer expects to extend his research to 50 additional plants. He stated that no scheme of management is well rounded out until it includes an incentive plan. He was supported in this view by Professor Lytle, who declared that employers generally are convinced of the desirability of incentives and are making use of them wherever they are regarded as feasible.

A clash of opinions was brought out when Dr. Balderston asserted that the burden of proof is not on the group incentive plan; rather it is up to each engineer to show why a job should be put on an individual incentive rather than a group incentive basis. Professor Lytle urged caution against excessive enthusiasm for the group plan. Group incentives, he said, are in about the same position that all incentive plans were a generation ago. At that time many men with more ambition than conscience rushed various plans into operation and did more harm than good, seriously damaging the case for incentives for many years. Mr. Weller agreed with Professor Lytle, stating that a great many shoals and rocks must be passed before the group bonus system can become generally applicable, and many soundings must be made before ways of avoiding these obstructions can be found.

Group Plan Stimulates Cooperation

In outlining advantages of the group incentive, Dr. Balderston pointed out the social pressure of the group spurs on both slackers and conscientious workers. Group feeling, under the in-

dividual incentive plan, frequently has the opposite effect. The more capable workers hesitate to do their best because they are afraid they will be blamed by their associates if rates are cut. Under the group bonus plan, on the other hand, the star worker becomes the leader and helps his fellows. In fact, an outstanding feature of the group plan is that it offers an incentive for the men to use their spare time to assist others. It also reduces the need for supervision—in many cases the men become self-supervising. It has great clerical advantages. Since the introduction of the group plan at the Packard Motor Car Co., Detroit, the number of men required to handle the payroll records has been cut down from more than 200 to 90. The real question at issue in deciding between group and individual incentives is to determine whether one wants to stimulate the teamwork of the gang or individual selfishness.

Incentives, in Dr. Balderston's opinion, can be used to advantage all the way from office boy to president. He confined his discussion, however, mainly to incentives for manual labor. In every company that he has studied unit labor costs were reduced when the day work method of wage payment was replaced by an incentive plan. A change to a group incentive plan has frequently resulted in a 100 per cent increase in efficiency.

Where the group plan is used the size of the group varies from two to 600 for direct labor. In highly mechanized plants with precise control the tendency is to enlarge the groups.

In determining the composition of a group the most important guiding principle is community of interest. Individuals who are interdependent, and can help each other, naturally form a group. The size of the group depends, to a large extent, on the manufacturing cycle and the evenness of the flow of work.

Group Incentive Best Adapted to Progressive Manufacture

The group incentive is most clearly adapted to progressive manufacture, said Dr. Balderston. Some companies like the Westinghouse Electric & Mfg. Co. first applied the group plan to progressive operations and then extended it to heterogeneous work. The Chrysler Motor Corporation has found it equally as satisfactory in departments turning out a variety of work as in single purpose departments. The Edison Electric Appliance Co., Chicago, has made perhaps the broadest

application of the group principle, using it for clerical work as well as for shop operations.

Ordinarily a leader or working boss is included in a group, being considered essential to the success of the group incentive, but foremen are ordinarily paid separately, being considered part of the management. At times some indirect labor is included in a group, for example crane operators and inspectors.

The setting of the task and measurement of results, asserted Dr. Balderston, is more difficult than deciding the composition of a group. A unit must be selected that best measures the work put forth. It must be simple, objective, clearly understood. At the Chevrolet Motor Co. counting the motors coming off the line is the basis for measuring the task.

Setting the Task and Measuring Results

It is important to decide at what level the task will be placed. Possible performance as disclosed by time study may be regarded as the ceiling and present performance as the floor. The task must be set somewhere between. Its location will depend on the degree that the company can exercise close control over the factors controlling the work. The management can get behind the men and shove, forcing them up toward the mark aimed at, or it can start the bonus low enough so that "a taste of the apple" will lead the men along.

The other half of the job, after setting the task, is to give the man a measurement of results as soon as possible. If he has to wait a week or a month for the bonus, the intended spur of the extra compensation is weakened.

In the ordinary group plan every member makes the same percentage of bonus, but the individual base rates differ. The difference in base rates in a properly developed plan provides an individual incentive within the group incentive. Under the group plan, base rates can be changed with variations in the labor market, but the task remains unaltered.

It is rather common practice in the Middle West to cut the bonus, but the answer, in the automobile industry at any rate, is that methods of manufacture are changing so fast that rates must be revised. Some companies, on the other hand, give formal guarantees that the rates will not be changed, but there are ways of cutting them without departing from the letter of these promises. Higher quality may

be demanded in the product or the hardness of material may be changed, making it impossible for men to do the tasks set.

A good rule is to change the task when the job changes. Swift & Co., Chicago, have a double check on changes in operations, said Dr. Balderston, and, whenever a job is changed, put it on a day work basis until a time study of the new operation can be made.

The tendency is toward group piece work because manufacturing operations are calling for more and more interdependent work, said Professor Lytle in commenting on Dr. Balderston's address. There is a place for both group and individual incentive plans. The Atlantic Refining Co., Philadelphia, uses several plans in the same plants. The question of group vs. individual incentive depends on the kind of work and is a subject of debate. Group incentives are not alone in reducing the need for supervision. The same thing can be said of

individual incentives. Reduction of supervision and savings in clerical work may be overemphasized at the risk of losing in other directions. After all, leadership is essential to stimulate the cooperation on which the success of the group plan hinges. A group leader may set a high pace or the reverse. It is difficult for leadership to function when the group becomes very large.

Mr. Weller, in commenting on the remarks of the other two speakers, stated that he inclined to the view that the group system should be introduced only where an individual incentive plan is impractical. He described in detail a group plan now in operation at the Barber Asphalt plant. He said that the company was guided by the following rules in setting up individual and group incentive plans:

RULES FOR INDIVIDUAL INCENTIVE PLAN

1. The output of the individual worker must be measurable in simple units.

2. Working conditions must be such that an output of the desired quantity and quality is obtainable without causing fatigue to the worker.

3. The wage incentive must be such that it will induce the worker to put forth his best efforts under the range of favorable and adverse conditions that he may encounter under normal operations.

RULES FOR GROUP INCENTIVE PLAN

1. The output of the group must be measurable in simple units.

2. The working conditions must be such that an output of the desired quantity and quality is obtainable by the group without causing fatigue to any one of the individual workers in the group.

3. The wage incentive must be such that it will induce each of the individual workers to put forth his best effort under the range of favorable and adverse conditions that may be encountered during normal operations.

4. The wage earnings of the individual workers of the group must be proportional to the effort, skill, experience or responsibility that is demanded of each one in carrying out his part of the group activities.

Robbins & Myers to Build Cranes and Hoists

A complete new line of electric and hand-power cranes, hoists and trolleys up to 10-ton capacity will be manufactured by Robbins & Myers, Inc., Springfield, Ohio, long engaged in the manufacture of electric motors, motor-generator sets and electric fans.

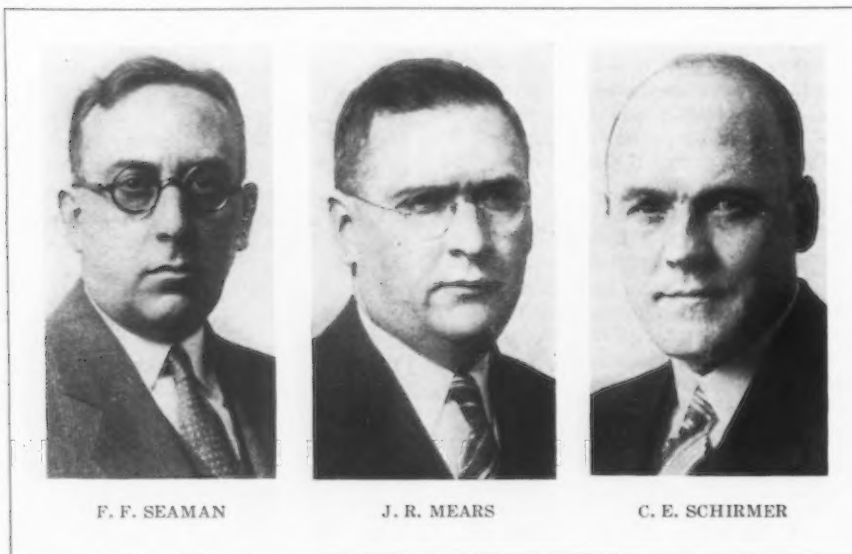
ness since 1907. He was formerly assistant engineer of the material handling divisions of the Union Pacific Railroad and the Schaffer Engineering Co., Tiffin, Ohio; chief engineer for the Toledo Crane Co., Bucyrus, Ohio, and recently chief engineer for Chisholm-Moore.

Sales will be in charge of John R. Mears, with offices in the Euclid

years has been a sales executive for Chisholm-Moore in the Eastern territory.

Chicago sales will be in charge of William J. Scott, who has been in the industry since 1912. His early training was with the Westinghouse industries in Pittsburgh. He later sold machinery and equipment for the Boyer-Campbell Co., Detroit, for six years, having resigned to take charge of Chisholm-Moore sales in Detroit. Since 1922 he has held a similar position in the Chicago territory.

John J. Becker, who succeeded Mr. Scott as Detroit district manager for Chisholm-Moore, will continue in the same capacity for Robbins & Myers. Previous to locating in Detroit he was a special representative for the Scully Steel & Iron Co., Chicago.



F. F. SEAMAN

J. R. MEARS

C. E. SCHIRMER

The executive, technical and sales personnel of the crane and hoist division were all formerly associated with the Chisholm-Moore Mfg. Co., Cleveland, in similar capacities. Frank F. Seaman, who has been appointed general manager of the division, has been engaged since 1902 in the design, manufacture and sale of hoisting machinery with the Sprague Electric Works, Yale & Towne Mfg. Co., Toledo Bridge & Crane Co., Euclid Crane & Hoist Co. and the Chisholm-Moore Mfg. Co.

Carl E. Schirmer, chief engineer, has been in the crane and hoist busi-

ness since 1907. He has had 15 years' experience in hoist and crane sales. For several years he was Chicago district sales manager and more recently general sales manager of the hoist and crane division of Chisholm-Moore.

Albert Kreh will have charge of sales for the New York district. For nine years he was instructor of mathematics and mechanical drawing in the Elizabeth (N. J.) Industrial Trade School. Later he was connected with the Singer Mfg. Co. and the Bethlehem Steel Co., and for the past 10

Four Steel-Treaters Chapters to Hold Joint Meeting

On May 10 there will be a joint meeting of the Philadelphia, New York, New Jersey and Lehigh Valley chapters of the American Society for Steel Treating at Bethlehem, Pa. The tentative program for the day includes registration at Drown Hall, Lehigh University, at 9 a.m., followed by a technical meeting at which papers will be presented by J. H. Parker, vice-president Carpenter Steel Co., Reading, Pa., and Mr. Sylvester, plant superintendent Bethlehem Steel Co. Following a complimentary luncheon in the main dining-room of the Bethlehem Steel Co., the members and guests will be conducted through the Lehigh plant of the company. In the evening a dinner and entertainment is scheduled at the Masonic Temple at which it is expected the Hon. Harold B. Wells, Bordentown, N. J., will be the speaker. Members of the four societies are cordially invited and urged to attend.

Exporters Warn Against Tariff Excesses

Foreign Trade Council Urges Congress Not to Offend Other Countries—

James A. Farrell Asks Further Shipbuilding Aid

THE National Foreign Trade Council, at the conclusion of its meeting in Baltimore last week, adopted a resolution opposing tariff revisions by Congress which might offend other countries, interfere with the growth of commercial interchange with them and cause retaliatory action on their part. It also declared for further Government aid for air transportation, additional legislation to help the shipbuilding industry, establishment of "free ports" under the tariff law to facilitate re-exports and Congressional action for the simplification of customs administrative law.

James A. Farrell, president, United States Steel Corporation, who is chairman of the council, devoted his closing address to "The Business of the Sea," in which he traced the developments in the upbuilding of the American merchant marine and urged further legislative aid.

Urges Government Aid in Building Cargo Ships

"While the Merchant Marine Act 1928, known as the Jones-White Act, was progressive and helpful," he said, "it must be recognized that it does not extend the same help to strictly cargo vessels, which really make up the bulk of the American tonnage and in which the greatest interest lies so far as the shipping public is concerned, as it does to vessels carrying passengers and mails. Such additional help would permit the shipbuilding industry to proceed with the design and construction of new modern tonnage in advance of the needs of American shipowners on various trade routes, and this work could be carried on in such a way as to effect economies in the cost of building ships in this country."

About 1500 persons attended the convention. It was the third largest ever held. Representatives of the United States Government and foreign countries, to the number of about 100, were present.

Radio Communications with Whole World Feature Banquet

The get-together dinner the evening of Wednesday, the opening day, was featured by a graphic demonstration of modern methods of communications. An unscheduled event was a radio message of greeting by President Hoover to the banquet hall from the White House. After the President completed his short address, in which he emphasized the remarkable developments in methods of communication and their bearing on trade and good

relations with foreign nations, Chairman Farrell, who presided, had the delegates and their guests rise and drink a toast to the President. Mr. Farrell sent messages to American chambers of commerce in various parts of the world, including Buenos Aires, Rio de Janeiro, Santiago, and other Latin American cities, London, Shanghai, Manila, etc., and to ships at sea. Replies were received within seven to 13 minutes. Ernest B. Filsinger, president of the Export Managers' Club, New York, addressed the banquet from the Hotel Bristol, Berlin, by radiophone. Col. A. H. Griswold, executive vice-president, Postal Telegraph Cable Co., New York, spoke interestingly on "The Romance of Communications." As messages were sent abroad and replies received, the routes they took were flashed by lights on a large map.

Charles M. Schwab a Speaker

Charles M. Schwab, chairman of the Bethlehem Steel Corporation, was introduced by Mr. Farrell as the "most beloved man in the industry with which I am associated." He and Mr. Farrell engaged in an exchange of compliments, as well as jests, and spoke in terms of comradeship. Representing the two largest rival units in the iron and steel industry, the men who grew up together, sometimes as associates, disclosed a warm friendship.

"We are competitors," said Mr. Farrell, "but when people have known each other as long as we have known each other there can be no jealousies."

In a spirit of humor, Mr. Farrell said that in walking up and down the streets of Baltimore he observed that all steel structures being erected were being built of steel from the Bethlehem Steel Co. But, he added, he was glad to see that Mr. Schwab's company at Sparrows Point was getting the business.

"I am going to Pittsburgh next week," Mr. Farrell continued, "and expect to see that every structure going up there is getting its steel from our company."

Mr. Schwab Pays Tribute to Mr. Farrell

Mr. Schwab recited the long friendship between Mr. Farrell and himself, starting with the time when both carried dinner pails in Braddock, Pa. Mr. Farrell, he said, was the first man to export steel to Japan for the United States Steel Corporation, and Mr. Schwab, formerly head of the Steel Corporation, said he was proud of the

fact that he was responsible for Mr. Farrell taking an official position with the Steel Corporation.

"Jim Farrell is one of the men who has helped to make America," Mr. Schwab continued amid applause.

Mr. Schwab said that in 1902 when the Steel Corporation was organized he went to New York to try to bring the organization together. One thing needed, he declared, was an export manager. Having known Mr. Farrell at Braddock, he selected him. Mr. Schwab told of how the export business of the Steel Corporation was rapidly increased through the good work of Mr. Farrell.

"Steel manufacturing is a great industry," said Mr. Schwab. "I have seen it develop from less than 1,000,000 tons to 55,000,000 tons annually."

Mr. Schwab spoke of the spirit of good will, good fellowship and optimism in doing business and of how good will in business will promote friendly relations between nations, as well as prosperity and happiness. Sentiment in business, he said, was just as important as good will. Mention was made of his friendships which had their inception in business. By rubbing shoulders with others, Mr. Schwab said, one can learn the real men as distinguished from unreal men.

Secretary Lamont Predicts Steady Expansion in Our Export Trade

Making his first public address since he became Secretary of Commerce, Robert P. Lamont spoke at the opening session of the convention on "World Trade Today and Tomorrow," pointing out that American exports represent about 15 or 16 per cent of the world total today and imports 12 to 13 per cent. The United States, he said, exports more than any other country, surpassing the United Kingdom by about 25 per cent, while imports are considerably less than those of that country.

"Per capita, however," said Secretary Lamont, "England exports more than twice as much as the United States, and its imports are three or four times greater in proportion to the number of inhabitants. France, Germany and Belgium also have a somewhat larger per capita trade than we, and so do certain primarily agricultural countries of high productive power, such as Canada, Australia, Argentina, and, above all, New Zealand. If it were possible to show for each country the ratio between exports and the value of domestic products, I am sure that we should find the United States standing even lower as regards

this ratio than as regards trade per capita. We export only about 10 per cent of those goods which we produce that are capable of transportation at all, and of our factory output only about 8 per cent. The corresponding proportions for the United Kingdom are probably nearly three times as high."

Secretary Lamont said that the history of American trade and that of the trade of the world as a whole promises much for the future. Now that the United States has become the world's greatest manufacturing country, and that manufactured products are the greatest class in its exports, it was declared, there is every reason to anticipate steady expansion in foreign trade, "perhaps even more rapid than that of most other countries."

Government Expert Tells How to Cultivate Canadian Trade

"Canada is our best customer because it needs our products and has ample resources with which to pay for them," the convention was told at its session Thursday afternoon by United States Commercial Attaché Lynn W. Meekins, stationed at Ottawa, who spoke on "Canada—Our Best Customer."

In 1928, Mr. Meekins said, United States exports to and through Canada were valued at more than \$916,000,000, representing 18 per cent of the total exports from this country. Canadian figures, it was stated, show that \$825,000,000 worth of imports from the United States were actually consumed in the Dominion last year. The difference between United States export statistics and Canadian import statistics was said to represent transit trade. Canadian purchases from the United States in 1928 exceeded by \$118,000,000 those of 1927, a gain which was larger than total United States exports to such markets as Mexico or Brazil or Belgium, and exports to Canada were nearly twice as much as to the 10 republics of South America and more than all Asia and Africa combined, Mr. Meekins stated.

"Take the 10 largest items, which ranged from \$25,000,000 to \$50,000,000 each," he continued. "Nine of them increased from 7 to 54 per cent over 1927. These nine were iron and steel products, industrial and mining machinery, automobile parts, petroleum, motor vehicles, farm implements, fruits, cotton and chemical products. The tenth, coal, decreased 7 per cent."

There are probably more different ways of selling American goods in Canada than in any other market, it was explained. The proper method of selling in Canada was declared to depend upon several factors: First, the product itself; second, the demand for it in Canada; third, the extent of competition in Canada; fourth, the manufacturers' sales policy. In any event, Mr. Meekins said, it is a good idea, before deciding upon the method of cultivating the Canadian market, to employ the facilities offered by the five Canadian offices of the United States Department of Commerce. Pointing

out the unique character of the Canadian market, because it is neither domestic nor overseas, but a contiguous export market, Mr. Meekins said that it should be handled as an export market.

Success Depends on Selecting Proper Marketing Method

Successful marketing in Canada was said to depend upon the selection of the most effective methods at the start, the right kind of approach to buyers, a modified type of advertising and continuous study of rapidly changing conditions. Firms in the United States handling Canadian business through their export departments, it was stated, are building a larger volume of business, while firms not doing so are complaining that their Canadian sales are not increasing. He suggested that American manufacturers granting exclusive sales contracts should set down in black and white whether Canada is included or excluded from the territory given to the export representative. Mr. Meekins said that the question of whether or not Canada should be turned over to a combination export manager for sales development is not easy to answer in a general way. Competitive conditions in the Dominion, he pointed out, make it necessary to quote prices on the closest possible margin. Canadian firms were said to prefer to deal direct with a manufacturer, because they think that lower prices will be quoted than they can get from a combination export manager. If there is no difference between the factory price and the combination export manager's price, Mr. Meekins said, the latter can handle the business more satisfactorily.

E. P. Thomas Draws Imaginative Picture of Future World Trading

In the opening session on merchandising, at which he presided, E. P. Thomas, vice-president, United States Steel Corporation, visualized through achievements in American export trade what merchandising may develop in the future. Pointing out that during the past 25 years exports from the United States have increased from \$1,000,000,000 to \$5,000,000,000, Mr. Thomas pictured the American exporter sitting at his desk calling up his selling agents in foreign lands and discussing high lights of business. He might, Mr. Thomas said, demonstrate by vitagraph to the salesman the machinery of the organization as it works in the United States, synchronized with sales thoughts in the United States to supplement the work of the agents. Sky advertising, placing of foreign orders on books in a few minutes, and shipping goods direct by superplanes, traveling at the rate of 200 miles an hour, if not too bulky and if too bulky shipping by huge dirigibles, formed a part of the vision described by Mr. Thomas.

Coordinating operations with friendly rivals, merging of warehouses, and collaboration in exchange of exports and imports in a more scientific way

than is now done were pointed to as probabilities of the future. Great banks, Mr. Thomas said, will have much more expanded facilities for directing foreign merchants, and capital will be largely directed to stabilizing foreign currencies, especially in Latin America. Manufacturers of those countries, it was declared, might develop to a point where instead of calling upon the United States for finished products they will require semi-finished products, which will be finished by cheap operations through the use of hydroelectric power.

March Sheet Sales Exceeded Shipments by 100,000 Tons

The heavy demand for steel sheets is indicated by sharp increases in sales, production, shipments and unfilled orders in March, as shown by the monthly report of the National Association of Flat Rolled Steel Manufacturers, Cleveland, covering the independent sheet mills. Unfilled orders, which gained over 50,000 tons in February, further increased 85,000 tons in March, having been 791,615 tons on April 1, compared with 706,955 tons on March 1. March sales were 464,297 tons, against 389,496 tons in February, and production was 364,202 tons, compared with 326,468 tons during the previous month. Sales exceeded production and shipments by 100,000 tons, the quantity shipped having been practically the same as the tonnage produced. March sales were nearly 147 per cent of capacity, and production and shipments were 115 per cent of capacity. The February report and comparisons in net tons follow:

	March	Feb.	Jan.
Total number of mills.....	722	722	725
Capacity per month.....	468,200	440,600	507,500
Percentage reporting.....	67.6	67.6	70.2
Sales	464,297	389,496	438,390
Production	364,202	326,468	391,404
Shipments	363,648	325,848	362,229
Unfilled orders.....	791,615	706,955	652,602
Unshipped orders.....	125,653	127,383	135,135
Unsold stocks.....	63,397	61,058	63,739
Percentages of Capacity			
Sales	146.8	130.8	123.1
Production	115.2	109.7	109.9
Shipments	115.0	109.5	101.7
Unfilled orders.....	250.3	237.5	183.2
Unshipped orders.....	39.7	42.8	37.9
Unsold stocks.....	20.0	20.5	17.9

A bibliography of industrial films illustrating processes of steel making or erection is included in the "fact book" of the structural steel industry, which is about to be issued by the American Institute of Steel Construction, New York. It is pointed out that most of these films are loaned free to responsible persons.

Orders received by the General Electric Co. for the first quarter of 1929 amounted to \$101,365,208, compared with \$79,925,840 for the corresponding three months of last year, an increase of 27 per cent, Gerard Swope, president of the company, announced.

Progress in American Machinery, 1925-1928

Designed for More Automatic Operation Than Ever, Eliminating Human Costs so Far as Possible

BY W. H. RASTALL*

AT the moment, early April, 1929, the American machinery industry is probably enjoying the greatest prosperity it has ever known, not excepting even the booms experienced during the war and the post-Armistice periods.

During recent years American machinery builders have been exceedingly active in developing new designs. It is probably safe to say that any machine tool or any piece of wood-working machinery designed ten years ago is now obsolete. Through the application of direct motor drive, frictionless bearings, higher speeds, heavier construction, better gearing, etc., it has been possible greatly to increase the capacity of each machine.

It is almost literally true that some marked improvement has been made in every one of these designs, and that these improvements are of endless variety. However, a few general tendencies may be observed:

(a) In the humanizing of machinery.

(b) In the development of new types and kinds.

(c) Refinement of design.

By "the humanizing of machinery" we refer to that tendency toward the development of automatic equipment, except that in recent years designers have gone far beyond anything even dreamed of previously. Developing single machines which will automatically replace a complete factory or factory department is one feature. For example, in Milwaukee is a building which covers perhaps two acres, which is, practically speaking, all one machine, and which is employed to produce without human help complete chassis frames for automobiles. Materials are fed into the building at one end and the completed frames are discharged at the other; practically no human labor is required between. And the whole unit is so speeded as to deliver a complete frame every 10 sec., or perhaps 5000 each working day. All are absolutely interchangeable, manufactured within close tolerances, in other words, by "mass production."

A second illustration is a new machine designed to produce automatically the columns used in structural steel frames of high buildings of the modern type. In one pass through the machine the material is assembled, drilled and keyed, ready to be riveted.

*Chief, Industrial Machinery Division, Bureau of Foreign and Domestic Commerce, United States Department of Commerce. From an article prepared for publication in *Maschinenbau*.

It is said that this machine effects a saving in the cost of fabricating columns of from 65 to 75 per cent and in addition speeds up production so as to make it possible to reduce greatly the time required for the erection of a steel structure. For example, the steel-work for a 25-story building in Chicago has been erected in 31 working days, as contrasted with the 12 to 13 weeks previously required.

A third example is a machine which will produce over 100 wooden automobile spokes a minute.

Each of these examples illustrates that tendency in American machine design to develop equipment which practically replaces all labor. This is not in the sense of saving wages, but in the sense of a mass production at costs far more favorable than anything previously known. Accuracy obtained usually is superior to that where the human element is involved, and a greatly-increased speed of output obviously contributes very favorably to the profitable manufacture involved.

In earlier years it was considered satisfactory in machine designs to correct the internal strains in the castings through the simple process of aging. But under the newer conditions it is found necessary to correct strains in these castings through some form of annealing process, so that there may be absolutely no deterioration after the machine is complete.

Bigger and better bearings, more rigid frames, greater speeds, greater dependability, in fact, better machines throughout are produced today.

Meetings Scheduled for Electrochemists

Meetings of the American Electrochemical Society have been arranged for as follows: Fall meeting, 1929, at Pittsburgh, Sept. 18 to 20; spring meeting, 1930, at St. Louis; fall meeting, 1930, at Detroit; spring meeting, 1931, at Birmingham, Ala., and fall meeting, 1933, at Chicago.

The spring meeting for this year is to be held at Toronto University, Toronto, Canada, May 27 to 29, tentative program for which was published in *THE IRON AGE*, April 4, page 982. Members of the New York Section will take the Toronto Limited, from the Grand Central Station at 6:30 p. m., eastern standard time, Sunday, May 26, reaching Toronto at 7:45 a. m., Monday, May 27. Since the publication of the program, a paper on

Only a few years ago most construction machinery was built mainly of gray iron castings, of ordinary structural steel and, where forgings were required, these were made of ordinary steel. In contrast to this, the newer machines are now worked up from alloy steels, heat-treated steels, special forgings, cast steel and other high-grade materials. Even the malleable iron now used has nearly twice the strength of the corresponding wartime material.

These illustrations indicate why the price per pound of the newer types of American machinery are relatively high. Yet, at the same time, they demonstrate why these types of machines more than justify their relatively high costs, not only through more rapid production and decreased labor costs, but also because of more accurate production.

In addition to progress in the design of individual machines there has also been great progress in plant layout, and frequently this subject is even more important than the design of the individual machine. In the newer factories close attention is given to all of the details of operation, so that the materials may flow consecutively from the point where they enter the factory as raw products to the point where they leave the plant in the finished form. Every effort is made to avoid unnecessary handling or unnecessary distances or irregular routing. Where production is "on the line," as in certain of the well-known automobile plants, these features are well advertised.

sponge iron for making electric steel has been scheduled and it is expected that an important discussion will follow its presentation.

Calvin Coolidge Elected to Conference Board

Former President Calvin Coolidge has been elected a councillor of the National Industrial Conference Board, it was announced at the monthly meeting of the board on April 18, by the president of the board, Magnus W. Alexander. The election as councillors of Dr. Frank Goodnow, president, Johns Hopkins University, Baltimore, of Dr. Michael Pupin, professor at Columbia University, and of Paul M. Warburg, chairman, International Acceptance Corporation, New York, also was announced.

Trade Rules for Concrete Bar Industry Adopted

ASHEVILLE, N. C., April 23.—Rules governing its conduct were adopted by the reinforcing steel fabricating and distributing industry at a trade practice conference held here last Thursday with Commissioner Garland S. Ferguson of the Federal Trade Commission. The greater part of the industry was represented. About 20 resolutions were adopted. Practices approved by the industry related to publication of prices and opposition to discrimination in prices among buyers, single bids, arbitration, standard contracts, itemized quotations and cost accounting. Among unfair practices that were condemned by resolutions were inducing breach of contract, misbranding or misrepresentation, secret rebates, price discrimination, illusory contracts, commercial bribery, dumping, departures from terms of contracts, non-mutual contracts and indefinite contracts. The conference was made permanent and will be called from time to time as developments may require for revision or amplification of the rules.

The commission will pass upon those adopted before promulgating its findings, which will denote the rules it accepts affirmatively, to be classed in Group 1, and those which it will receive without approving or disapproving, to be classed in Group 2.

Conference Board Reports on Foreign Economic Trends

Rapid spreading of the cartel movement throughout Europe, even into the smaller industrial countries of the Continent, is disclosed in the various reports on current economic developments in foreign countries made to the National Industrial Conference Board, 247 Park Avenue, New York, by its foreign correspondents, whose special reports constitute part two of the board's second semi-annual volume on world economic conditions, just published.

Cognizance is also taken of the American economic penetration of Europe, indicating a significant reversal of the flow of capital and industrial enterprise between the two continents, and governmental policies in the various countries relating to industry and trade. The international economic implications of such policies are discussed in detail. A summary picture of economic progress in each country is contained in the first part of the volume, giving data on production, wages, employment, prices, foreign trade, public and private finance.

The significance of these foreign reports made to the Conference Board is described as follows by Magnus W. Alexander, president:

"Constantly changing economic conditions both abroad and in the United States since the war and the increasingly closer economic relations between the United States and other countries have made more compre-

hensive and better information on foreign business trends a paramount need. Realizing this need, the National Industrial Conference Board has undertaken to supply such information at intervals, not only from available official statistics, but chiefly through authentic analytical reports from outstanding men in the industrial, commercial and financial life of the various foreign countries, including eminent economists and statesmen.

"The Conference Board, in the pursuance of its aim to make available to American industry comprehensive, authentic and timely information on economic trends affecting business life, is collecting these reports from at present 29 foreign correspondents who, in spite of the responsible positions held by them in their own countries, voluntarily prepare these analytical statements to the Conference Board with remarkable regularity, in order to further the exchange of information on economic conditions between their countries and the United States for the benefit of industry and commerce throughout the world, and for the farseeing purpose thereby to aid in furthering better international understanding and relations."

Zinc Institute Officers Re-elected

A market broadening program whereby it is proposed to increase the annual sales of slab zinc from 600,000 to 1,000,000 tons, as described elsewhere in this issue, was unanimously adopted by the membership of the American Zinc Institute at its eleventh annual meeting at Hotel Statler, St. Louis, April 16 to 18.

In addition to the address on this subject by Theodore Marvin, as abstracted on another page, there were other discussions of the same general topic. Dr. L. D. Redman, New York, spoke on the "Value of Research," and Malcom McGhee, Chicago, on the "Technique of Industrial Sales and Advertising Research."

Others on the program included William E. Humphreys of the Federal Trade Commission, who discussed the work of the commission, and Dr. Charles Camsell, Deputy Minister of Mines of Canada, who told the members of the institute that the Dominion will take its place among the important zinc producing countries within the next few years.

Ralph M. Roosevelt of New York, president, and other officers were re-elected as follows: A. P. Cobb, New York; P. B. Butler, Joplin, Mo., and John A. McCarthy, New York, vice-presidents; Stephen S. Tuthill, New York, secretary, and Howard I. Young, Mascot, Tenn., treasurer.

The following directors were elected for three-year terms: Edward W. Furst, Cleveland; Benjamin Lissberger, New York; John A. Robinson, Miami, Okla.; Edgar L. Newhouse, Jr., New York; Arthur

Thatcher, St. Louis; F. C. Wallower, Joplin; B. N. Zimmer, New York, and R. M. Roosevelt.

Aluminum Alloys Described for Steel Treating

E. H. Dix, Jr., metallurgist, Aluminum Co. of America, New Kensington, Pa., addressed the New York chapter of the American Society for Steel Treating, Monday evening, April 22. While his subject was "Aluminum Alloys Used in Aircraft," the speaker broadened the scope of his lecture, which was illustrated with lantern slides, many of them unique in the manner in which they reproduced the physical properties of the various alloys.

Starting with the alloy duralumin, Mr. Dix enlarged upon the other alloys which are possible by varying the copper content up to 8 per cent and higher. Later he pointed out the properties of the silicon-aluminum alloys with variations in silicon content from 6 to 10 and 13 per cent. Special alloys were also described, some without any magnesium, one or two with nickel, and others with variations in the alloying elements.

Particularly interesting was his discussion of the discovery and production of Alclad, of which Mr. Dix himself was the originator. The method of coating duralumin with aluminum was briefly touched upon. The author's discussion of the various methods of aging and heat-treating alloys, suitable for casting and for rolling or forging, were instructive. The speaker wound up his lecture with pictures and a description of the incorporation of certain types of rolled products in railroad cars, in furniture, and in aircraft.

The evening's program was opened with the running off of a two-reel film entitled "Story of the Heat Treatment of Steel," produced by the United States Bureau of Mines at the plant of the Hupp Motor Car Corporation, Detroit. This gives general details of the heat treatment of the 1434 steel parts entering into the construction of an automobile.

The next regular monthly meeting of the chapter will be held Monday evening, May 20, the last one of the season, at which J. P. Gill, metallurgist, Vanadium Alloys Steel Co., Latrobe, Pa., will discuss "Picking Tool Steels and Their Heat Treatment." A film will be shown describing the operation of the Ajax high-frequency electric furnace.

A report of the nominating committee for officers for the ensuing year was presented as follows: Chairman, Edgar C. Bain, research laboratory, United States Steel Corporation, Kearny, N. J.; vice-chairman, Edwin F. Cone, associate editor, THE IRON AGE, New York; secretary-treasurer, T. M. Holden, Jr., chief metallurgist, E. W. Bliss Co., Brooklyn. Election of officers and executive committee will be announced May 20.

To Seek Broader Markets for Zinc

Favorable Action Taken by Zinc Institute on Proposal to
Launch United Program—Theodore Marvin
Speaks for Zinc Extension Committee

AT its annual meeting at St. Louis last week the American Zinc Institute laid the ground work for a broad program of market and technical research and sales promotion. Following an extensive report by its Zinc Promotion Committee the directors authorized the president of the institute to appoint a committee to formulate plans for submission to all smelters and producing companies to learn whether they will participate in a market broadening campaign for a reasonable period of years. The plan calls for a contribution of 50c. per ton of slab zinc produced, 25c. of which will rest on the smelter who buys the ore and 25c. on the producer of the 2 tons of ore required to make a ton of slab zinc.

This action followed the submission of the report of the Zinc Promotion Committee by Theodore Marvin. His remarks follow, in part:

Zinc Capacity Excessive

The situation in which the zinc industry finds itself today is too well known to all of you to require any lengthy discussion. It may be summed up in the phrase, "The potential and quickly available supply far exceeds the natural demand for zinc." This is true, in spite of a relatively large increase since 1921 in per capita consumption, being the result of three factors, each of which has contributed to the increase in available supply. These factors are: First, the new deposits and the further development of existing deposits; second, technical advancements which have made possible the utilization of ores never before successfully concentrated; and third, the adoption of more efficient methods of smelting and refining.

The effect of these factors began to be felt in 1926, when the price curve of zinc, which had been rising, took a sudden drop. The decline continued through 1927 and the price increase of 1928 was not sufficient to bring it back to a satisfactory level. As a result of this condition, the evils which invariably appear at such times, namely part-time employment, price cutting, reduced profits, idle mills and machinery, and the scramble for purchasers, have become serious problems.

The zinc industry is not unique in the situation in which it now finds itself; there are many more which have encountered most difficult problems in the past. We have investigated

38 of these industries which were confronted with conditions similar to those the zinc industry now is facing, and which solved them by market broadening work. Among these are cement, wallpaper, brick, kitchen utensils, metal lath, greeting cards, domestic oil heating, lumber and others of as widely differing industries. In studying the organization of these market broadening associations, the following phases were included: object, general plan of organization and attack, personnel, market survey and technical research, advertising, and the many other forms of public relations. Throughout these investigations it was clearly evident that it was economically unsound for an individual company or small group to attempt to solve the problems of an entire industry. Results were possible of achievement only by concerted industry action.

As a result of our studies, we believe that the zinc industry can likewise solve its problems by similar action. We are submitting our recommendations covering a continuation of our initial market broadening investigations with a view toward active institute pursuance of its markets.

Reduced Output Not an Adequate Remedy

Before entering upon a discussion of our findings and recommendations, it is desirable to point out that there are two distinct points of approach toward such problems as those with which we are confronted. One begins with the producer, the other with the consumer. The one brings immediate relief, the other provides the greater benefits in the long run. At times both are essential.

It probably is true that over-production is a lack of demand for the excess. This condition indicates, or presages, a lagging industry that is bound to go into the depths further unless the proper necessary steps are taken. Under these conditions we have a buyer's market.

Whenever an industry is confronted with a surplus or even a potential surplus so great as to have such an adverse effect on the market, the first attempt at relief is usually directed toward decreasing production.

But curtailment of production alone cannot be regarded as the final solution, for, without in any way depreciating the value of this essential pro-

cedure, it is but fair to point out that it is comparable to that of an army in war time, which withdraws to take up a previously prepared position in the rear. This procedure may save the army from utter defeat, but it can never win the war. Other plans must be developed which will permit further aggressive action.

Market Broadening Plan Necessary

The chief, and in a sense, the only fundamental and basic objective of a program of market broadening procedure is that of increasing sales of zinc and zinc products to the end that increased consumption, without entailing enlarged industry investments, will lower costs and increase profits. However, we believe that this simple statement of a general objective is too broad and too general to serve as the basis for intelligent planning. It seems to us that a definite mark should be set up for the industry to shoot at and a definite time limit selected for the effort.

After a study of the production facilities of the industry and a survey of the present development of the market, combined with a study of the progress made by other industries under similar conditions, we have come to the conclusion that the objective of the market broadening program should be *to sell a million tons of zinc a year by 1935*. Furthermore, we believe that this objective is well within the reach of a united industry, and we also believe that, when this objective is attained, the most vexing troubles of the industry will be eliminated.

Objective: Sales of a Million Tons a Year

The proper development of our industry to a point where sales approximate a million tons a year, requires work along the following lines:

1. Competitive selling activities in known markets.
2. Study of market possibilities in fields now consuming unknown amounts or no zinc.
3. Technical studies of zinc in terms of its application to known uses and to new and untried uses.

So little is known of the ultimate destination of zinc after it leaves the fabricating and converting plants, that there is great need for detailed

information before the industry can be properly developed.

Consequently, it is recommended that a complete market research be undertaken to attain the following objectives:

1. To trace the course of zinc and zinc products from fabricator to consumer.

2. To classify consumers of zinc and zinc products according to (a) quantity purchased and (b) use made of zinc.

3. To study consumption of zinc in its various forms for resulting possibilities of increasing consumption.

4. To study the relative standing of zinc and its competitors in all divisions of the market and to report the factors operating to hamper the increased use of zinc in these markets.

Technical Research to Supplement Market Study

Opportunities for technical research directed at problems of satisfactory utilization are many and varied. The consumption of zinc in certain industries apparently is now hampered by difficulties of a technical nature, for instance, troubles in zinc coating. Possibilities exist for the application of zinc to purposes for which it has never yet been successfully used. These applications abound wherever metal or metal substitutes are used. Individual manufacturers here and there, when confronted with such problems have under force of necessity worked out satisfactory solutions, but this knowledge does practically nothing to broaden the zinc market. It is of value merely in enabling one producer to retain his own trade.

Therefore, it is recommended that the technical research division of your market broadening organization undertake the solution of those technical problems which, revealed by survey facts, will contribute most to the welfare of the industry.

Numerous opportunities exist for starting this work immediately, through cooperation with existing Governmental and educational institutions, such as the Bureau of Standards, Bureau of Mines, Mellon Institute of Industrial Research.

Public Relations and Advertising

Public relations activities and advertising must, of necessity, be preceded by market investigation. Far too many associations and other selling organizations have wasted their appropriations for these purposes by projecting campaigns toward markets of unknown value and importance. It is true, perhaps, that a certain amount of general educational publicity concerning zinc can be started immediately, but even that demands very careful study and planning.

Public relations activities must include the introduction of zinc information to the men who recommend its use. Among these are the architects, contractors, and supply men. The fabricator and other large consumers of zinc constitute most important al-

lies, but we must carry the story to them by news, advertisements, lectures, bulletins and association with them at their meetings. These are legitimate avenues of market broadening, and are being utilized energetically by zinc's competitors.

Financing the Work

The experience of a large number of associations engaged in market broadening activities has clearly demonstrated the fact that the fairest and most equitable way to finance such work consists in an assessment on each member, based on production.

Consequently, it is recommended that the financing of this program be carried out under direction of a committee (to be appointed by the president and approved by the board of directors) by means of such an assessment. The collection of the various allotments can be expedited and simplified by levying the apportionments directly against the smelters, according to their quarterly production reports. The smelters in turn will prorate the miner's share according to their purchases of concentrate from the various producers. It is further recommended that the division of appropriation be made on a fifty-fifty basis between mine and smelter, and that for purposes of prorating the miner's share, one ton of slab zinc be taken as equivalent to two tons of concentrate.

At this early stage of the work, it is difficult to recommend a definite annual appropriation for successfully carrying out the program which we have suggested. However, we do believe that the objective, to sell a million tons of zinc a year by 1935, can be attained with an appropriation which shall not exceed 50c. per ton of equivalent slab zinc per year, of which \$50,000 is needed immediately to commence work on necessary market surveys.

Direction of the Program

The importance of the program which has been recommended to the Zinc Institute, its specialized nature and the necessity for prompt action, if our objectives are to be successfully accomplished, make it essential that its direction be entrusted to the president and a small but representative committee of the institute (to be appointed by the president) both being responsible to the executive committee for the organization of the necessary personnel and placing in operation of the program. It is emphasized that established organization for carrying on this program will function as an entirely separate division or bureau of the Institute and accountable only to the president and the executive committee.

This report is respectfully submitted with the firm conviction that the adoption of this program (the phases of which will be dictated only by facts secured by market and technical surveys) in its entirety will bring economic stability and increasing pros-

perity to the zinc industry through the attaining of the following objectives:

1. A greatly increased demand for zinc.

2. Close and mutually satisfactory contact of the industry with the consumer.

3. Elimination of excessive competition from other products.

4. Recognition by the consumer of progressive industrial leadership which will attain those benefits always enjoyed by industries whose positions are thus assured.

5. And resulting directly from the successful attainment of these results, the industry may confidently look forward to lowered production costs and increased profits.

Scrap Industry Will Hold Trade Practice Conference

A national conference of the scrap iron industry to formulate rules of business practice will be held in Pittsburgh on May 23 at the invitation of the Federal Trade Commission. A trade relations committee has been appointed by the Institute of Scrap Iron and Steel to prepare for the conference.

This committee is headed by Charles Dreifus of Charles Dreifus Co., Pittsburgh, as chairman, and Charles Bock of M. Bock & Sons, Buffalo, as co-chairman. The other members are Joel Claster, Luria Brothers & Co., Reading, Pa.; Harry Ehrlich, Springfield, Mass.; Joseph G. Hitner, Henry A. Hitner's Sons Co., Philadelphia; Herman D. Moskowitz, Schiavone-Bonomo Corporation, New York; John R. Briggs, Henry Potts & Co., Philadelphia; George B. Doane, Perry, Buxton, Doane Co., Boston; Ben Cohen, Louis Cohen & Son, Wilkes-Barre, Pa.; Joseph Maher, Pennsylvania Wood & Iron Co., Buffalo; Carl R. Briggs, Briggs & Turivas, Blue Island, Ill.; Samuel Sumner, Joseph Schonthal Co., Columbus, Ohio, and Morris Speer, Rotter-Speer Co., Cleveland.

The trade relations committee, at a recent meeting, considered the conditions of the industry and the type of resolutions to be submitted at the trade practice conference. Seventeen subjects were discussed and approval was given by the committee to 13 subjects, on which appropriate resolutions will be prepared for consideration by the national conference. The resolutions, after approval by the conference, will be presented to the Federal Trade Commission for consideration and sanction.

Among the subjects discussed were the following: Doctoring or "top-dressing" of cars, defamation of competitors, overbilling of shipments, failure to deliver or fulfill on contract, inducing breach of contract, shipping material other than called for by contract, billing an inferior grade of scrap as a higher commodity, and commercial bribery.

This Issue in Brief

Group bonus superior to individual bonus, says one investigator. Not so, says another. Group bonus exerts pressure on entire group, slackers and conscientious workers alike, reduces need for supervision, cuts record-keeping, and encourages men to use their spare time to help others, says proponent. "Use group bonus only when individual bonus is impractical," says opponent.—Page 1159.

* * *

Copper consumers will be protected by trading in copper futures, says Metal Exchange head. Buyers will be able to protect themselves against violent price movements in a manner never before possible, it is said. Rules will permit daily fluctuation of not more than 2c. above or below previous day's close.—Page 1158.

* * *

Breaks automobile production record by 23 per cent. March output of cars and trucks, totaling 584,733 units, highest ever reached. February, 1929, held previous record, with a total of 475,373 units.—Page 1158.

* * *

Iron loses weight in water, even when rust does not show. A bright nail submerged in water will lose perceptibly, though it still remains bright. Addition of chromium makes iron insoluble in water.—Page 1140.

* * *

Discovery of stainless steel no "accident." Brearley's discovery was due to the "observed fact" that certain acids did not etch some of the alloys under investigation, in his search for a gun lining that would offer increased service.—Page 1139.

* * *

Low-cost production of sponge iron now commercially practicable. Iron ore or iron oxide material is mixed with coke or other fuels and heated in reduction ovens similar to by-product coke ovens. Ore is fully reduced. Iron produced is of high quality. Reducing equipment is relatively low in cost.—Page 1143.

Continuous foundry unit requires less than one-third the space necessary for a floor type foundry and has double the capacity, says conveying equipment manufacturer. Night shifts can be eliminated, and labor costs are cut, as the workmen become specialists and a large part of the work formerly done by them can be handled by common labor.—Page 1146.

* * *

Hardens automobile parts with nitrogen and cuts cost of parts almost 50 per cent. Electric furnace is filled with loose pile of parts, sealed, and gas flow started, the heat raised to 975 deg. Fahr., and kept for 21 hr. Case is 0.008 in. thick, with 900 Brinell hardness. Nitralloy costing 12c. to 15c. a lb. takes place of stainless steel costing 20c. to 30c. a lb.—Page 1150.

* * *

Higher strength, increased corrosion resistance and reduced weight are advantages of aluminum-coated duralumin over uncoated. Attack on coated sheets is found by Bureau of Standards to be entirely negligible, even with severe corrosive conditions. Page 1152.

* * *

Drop forging surfaces cannot be parallel to the path of travel of dies. Surfaces must depart from parallelism by an amount not less than the draft angle and in the direction which will make all parts of the forging smaller at the bottom of the impression of each die than at the top.—Page 1152.

* * *

Is fear of blame for reduced rates causing capable workers to do less than their best, where individual incentives are paid? Highly efficient workers are frequently held back by fear of their associates, says investigator. He recommends the group bonus plan, with the star worker becoming a leader and a help to his fellows.—Page 1159.

Eliminates brass melting losses by use of metallic retort, and cuts fuel consumption to 2½ cu. ft. of gas per pound of brass melted. The melter consists of a revolving metallic retort, externally fired with 10 gas burners and inclosed in an insulated sheet steel drum.—Page 1158.

* * *

Advantages of both group and incentive bonus incentives can be had by paying each member of a group the same percentage of bonus, but varying the base rates. Thus an individual incentive may be developed within the group incentive. This plan allows the base rates to be changed with varying conditions in the labor market, without altering the group bonus.—Page 1159.

* * *

Canadian business should be treated as export business, says commercial attaché. American manufacturers who fail to appreciate this are not getting their share of business in this country's most important export market. Canadian buyers prefer to deal direct with the producer.—Page 1162.

* * *

Electroplated wooden parts are considerably stronger than plain wood. Compressive strength of metallized airplane strut is increased 65 per cent, and elasticity 50 per cent. The material is coated with a conductor like carbon dust, and kept in motion in the plating bath.—Page 1152.

* * *

Cuts carburizing costs by use of rotary carburizer. Parts are shoveled into a cylinder installed inside a box-shaped electric furnace chamber. Parts are carburized as they are tumbled, resulting in uniform carburization. Labor cost is reduced 60 per cent and carburizing compound consumption is cut 40 per cent, says furnace manufacturer.—Page 1154.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

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The Steel Corporation's Stock Issue

SEEING that Wall Street's expectations of bonuses, stock split-ups and extra dividends commonly take on high color, its alleged disappointments need not be regarded too seriously. The Steel Corporation's announcement of the terms of its new common stock issue for bond redemption is a case in point. Wall Street looked for "rights" worth \$15 to \$20, whereas they have sold at \$6, or somewhat more.

When lower Manhattan was agog some weeks ago with rumors of the proposed stock offering, *THE IRON AGE* suggested that Wall Street stories of a prospective "melon cutting" were quite extravagant in view of the moderate scale of profits in steel. We added that the new financing was rather the climax of years of highly conservative management, its aim being, by the wiping out of bonded indebtedness, to make the corporation proof against any future stress, however severe. Now that the common stock increase has been fixed at one-seventh the present volume and the price at \$140, it would appear that future benefit was first in the thought of the finance committee, present benefit being secondary.

The common stockholders' new status will appear from the example of one who before the stock dividend of 1927 held 100 shares, which, we will say, cost him \$100 per share. His investment was \$10,000 on which he received 7 per cent or \$700 a year. The stock dividend gave him 40 additional shares on which he receives 7 per cent or \$280 a year, making a total return of 9.8 per cent on his \$10,000 investment. He can now subscribe for 20 shares of the new stock issue at \$140. His additional investment is \$2,800, on which he will receive (the dividend being still 7 per cent) \$140 a year, or a 5 per cent yield. Thus on a total investment of \$12,800 his dividends will be \$1,120 or 8.75 per cent, as against 9.8 per cent at present on his investment of \$10,000.

But while the stockholder will for a time at least receive only a 5 per cent return on his new investment, the retirement of the corporation's funded debt will reduce its yearly fixed charges by \$29,247,350. A 7 per cent dividend on the 1,016,605 shares of new common stock would call for \$7,116,235, so that the net saving of \$22,131,115 resulting from the bond redemption will be an annual increment to surplus. On the 8,132,840 shares of common stock that will soon be outstanding, this figures out \$2.72 per share that in time may come to the stockholders through extra dividends in cash or stock. If he elects to make no increase in his \$10,000 investment and to forego the chance of future benefit, our suppositious stockholder may sell his \$140-"rights," getting in cash \$6 more or less for each.

Having worked up its furore in advance, Wall Street had none to expend on this master stroke of steel finance when its details were made known. Hence the street was said to be disappointed. But if we mistake not, this and other pending plans by steel companies to finance themselves by stock rather than by bonds will mark a new epoch. Followed out year after year the policies on which the steel corporation has built its financial structure will put the industry in a new position of strength and make its stabilizing influence felt in the entire field of business.

Zinc Falls in Line; Steel Next?

ZINC producers, following the example of other industries, are preparing to inaugurate a campaign for broader markets. The American Zinc Institute, meeting at St. Louis last week, authorized its president to appoint a committee to formulate plans for technical and market research and promotion. This step follows a year of investigation by the institute's Zinc Extension Committee.

As was well put by Theodore Marvin in reporting the results of the survey, it is economically unsound for an individual company or a small group to attempt to solve the problems of an entire industry. Concerted action is necessary, he said, being dictated by such important factors as loss of business to other industries, excessive productive capacity and lack of information regarding present, as well as potential, uses of zinc. He recommended that the industry commit itself to the definite objective of selling one million tons of zinc a year by 1935. The program prerequisite to achieving that aim would include market study, technical research, educational publicity and advertising.

Investigation of markets would disclose the course of zinc and zinc products from smelter and fabricator to consumer, classifying consumers according to quality purchased and the use made of the metal. It would uncover possibilities for new uses and would compare the standing of zinc in relation to that of competitors, noting the factors obstructing its sale. Coupled with market study would be research to remove technical difficulties hampering zinc consumption and to develop satisfactory applications of the metal to new purposes.

Such a program differs in no important particulars from the plan that has been repeatedly urged upon the steel industry in these columns. To be sure, steel mills are now operating virtually at capacity and would be burdened, rather than helped, by added business. But this condition is of relatively recent appearance and is not expected to last. In a special bulletin C. E. Mitchell, chairman of the National City Bank of New York, says that business already shows

evidences of being adversely influenced by the credit situation.

With this uncertainty facing it, the steel industry can well take to heart the counsel of Charles M. Schwab at the last meeting of the American Iron and Steel Institute—in prosperity prepare to keep prosperity. No time is more favorable for launching a united campaign to broaden markets for finished steel.

Congress and Stock Speculation

IT was a foregone conclusion that Congress would take a hand in the controversy over stock market speculation, the diversion of bank credit to such use, and the efforts of the Federal Reserve Board to restrict it. The fear is that it will do so in a meddling and bungling way and that even the existence of our Federal Reserve system may be jeopardized.

The case is simple and yet it is not simple. This is to say that it is capable of a simple statement, but that it introduces a problem which is far from simple. The reforming desire, that is well expressed by ex-Senator Glass, is to eliminate what is considered to be gambling in stocks. Some eminent financial journalists say that there is no such thing; that for every transaction in the stock market there must be a delivery of evidence of ownership, which is essentially different from what happens in betting on a horse race or upon the incidence of the ball upon a roulette wheel. Without any doubt these financial protagonists are technically correct. On the other hand, there is no doubt that ex-Senator Glass and others who think as he does are correct in seeing a process of gambling that is deplorable.

In theory there is no difference between the buying of a piece of land and borrowing money (that is to say, using bank credit) for a portion of the purchase price and the buying of a parcel of a corporation in the same way. There was in the later years of the war a great speculation in Western farm lands conducted with just such machinery, and by just such methods; and the Federal Reserve Board was, and still is, hotly criticized for deflating that speculation during 1920. There is constantly a great speculation in urban real estate, in which fortunes are both made and lost. Even do we hear of stars of the cinema successfully engaging in such transactions in southern California. Speculation in commodities is precisely of the same order and conducted in the same way.

The difference between speculation in real estate and in stocks is chiefly that the former is necessarily conducted on rather a large scale, while the latter, owing to the very minuteness of subdivisions, is capable of being entered into on a small scale. We cannot imagine Tom, Dick and Harry entering into speculations in real estate, but we can not only imagine their participation in stock speculation, but also we know that they do. It is such participation that ex-Senator Glass and others would like to eliminate. We conjecture that they have not much concern for the bulls and the bears or even for the wolves, and that what they would like to take care of is the lambs.

Unfortunately there is no way which any one has been able to think of so far that will effect such a discrimination. Any one is as free to borrow a little money (credit), if his bankers will let him, as he is to borrow a great deal. Borrowing can be made dif-

ficult by raising the interest rate, but the Federal Reserve Board is reluctant to do that for the obvious reason that the borrowing for manufacturing or other producing purposes would be injured. An operation of that kind would naturally tend to slow up production.

On the other hand, a radical action tending to check speculation in stocks, which might produce a sudden collapse in the market, would also have an adverse effect upon general business. This is the reason why not long ago, when the rate of call money rose to 20 per cent and the stock market was crumbling rapidly, the National City Bank came forward with funds and relieved the situation, thereby incurring considerable criticism.

Consequently we are confronted by two horns of a dilemma. We can easily imagine what a mess may result from a Congressional attempt at solution and rectification. The old economical precept of *laissez faire* no longer obtains very much; but in the present juncture in respect to this particular problem we are inclined to think that *laissez faire* will be the only solution.

Dog Eat Dog

RECENTLY there were intimations that railroad labor would soon demand a six-hour day without any reduction of wage in order to provide jobs for the boys who are now out of them. A cynical railroad operator remarked that when the brotherhoods really demand this they will probably get it. The public will pay. Thus is there philosophic resignation.

That is the last thing in the world that there ought to be. The public ought to be horrified and up in arms at the very suggestion. Here we have the hoary labor union tradition and fallacy of making work for superfluous workers who choose to stick to one occupation.

Perhaps we should not blame the unions. In a way they are guilds that are organized to get for their members all they can. If the creation of jobs can be dictated, or of terms, so be it.

The blameworthy party is the public that lets them do it. The public consists almost entirely of working men. Some of them operate the railroads. Others of them build houses. Others manufacture clothing. Others mine coal. And so on. If one group manages a grab or arranges a waste the others suffer. It is a case of dog eat dog. The rich may be mulcted through taxes, but they are too few to pay enough in railroad fares to give eight hours pay for six hours of work by a million and a half railroad men, plus the out-of-work boys for whom jobs are to be made.

This ought not to be a fight of the railroad companies but rather of the public. Unfortunately the railroad companies in the past conducted themselves so stupidly that they acquired the hostility of the public and the latter remains blind to its own interest. If the public had its eyes open and its mind in working order, the politicians would sense it and instead of harassing the railroad companies would make their watchword annihilation of that type of unionism.

FOREIGN demand for tin plate, particularly American, has reached the largest volume in history. Judging world consumption by the combined American

and British exports, the volume to March 1, this year, is 51.5 per cent larger than in 1913 and 9.5 in excess of that of last year. Conspicuous in this expansion have been the American sales. In 1913 these were only 6100 tons a month. By 1928 they had expanded to 20,800 tons each month, reaching a volume of 26,500 tons monthly to March 1, this year.

The World's Power Supply

IN its recently issued statement of the world's power supply in terms of thermal units, the Bureau of Mines makes what is probably the first exhibit of the sort covering all countries. For an individual country the first statement so far as we know was that published in the editorial department of *THE IRON AGE* of Dec. 7, 1916, showing that in 1915 the production of coal in the United States represented 15,116 trillion B.t.u., petroleum 1602, and natural gas 644. Statistics had long been published of quantitative production of these fuels, in tons, barrels and cubic feet, respectively, and it seemed well to compute the thermal units so as to compare the relative importance of the fuels. In recent years this method, apparently pioneered in these columns, has been coming into vogue.

The following Bureau of Mines table shows the heat equivalent of world production, in trillions of B.t.u., water-power being converted by use of a suitable factor:

	1913	1920	1923	1928
Coal:				
Bituminous and anthracite...	34,946	33,595	34,503	35,338
Lignite	1,778	2,042	2,144	2,847
Total coal	36,724	35,637	36,647	38,185
Oil and natural gas.....	2,938	5,030	7,081	9,538
Water-power	1,750	2,660	3,580	4,660
Grand total	41,412	43,327	47,308	52,383

We see almost no increase in bituminous and anthracite. There is a large percentage increase in lignite, which is due chiefly to Germany's development of lignite, in the shortage of good coal after the war, and today about half the German output is lignite. There is 225 per cent increase in oil and gas from 1913 to 1928 and 166 per cent increase in water-power.

Of course, these statistics make one wish for more, since the statement is purely of thermal units available, not of power actually obtained. All are familiar with the rapid progress made in the United States in recent years in obtaining more power from coal. Since 1919 the public utilities have approximately doubled the kilowatt-hours obtained from a ton of coal, and it is known that private power plants have done well also.

It will be recognized that these thermal units were by no means all converted into what we may call horsepower, much being used for heating purposes. It is convenient to use the word "power" in the sense of results. From 1913 to 1928 the equivalent thermal units available to the world increased only 26 per cent, from 41,412 trillion B.t.u. to 52,383. Actual results undoubtedly increased very much more. The United States has had large capital resources for effecting improvements in utilization, but the fuel itself has been cheap except in the relatively small areas of power production remote from the fields producing the fuel. Elsewhere in the world there has been less capital available, but in many places the fuel cost has been so high as to attract such supplies of capital as there

were. We may rest assured that the world at large is getting much better power results from its thermal units than before the war, involving much more than 26 per cent increase.

From the economic viewpoint the story does not end there. Given a thousand or a million horsepower, more useful service is performed now than formerly. Per foot-pound of energy developed the locomotive renders better service in transporting freight quickly and passengers comfortably. In the factory a given amount of horsepower in the central plant delivers more power to the individual pieces of machinery and the machinery in turn does much better work with the amount of power it receives.

Correspondence

Nickel in High-Test Cast Iron

To the Editor: On page 1073 in the April 18 issue of *THE IRON AGE* I find a brief résumé of my speech on "High-Test Cast Iron" at the foundrymen's convention in Chicago. This may give the impression that Professor Piwowsky would be responsible for the remarks made relative to the manner in which the American and European foundrymen approach the problem of producing high-test cast iron.

I mentioned that Professor Piwowsky and Dr. Nipper had been kind enough to give me information relative to recent developments in foundries in Europe, and especially in Germany. This information enabled me to draw my conclusions.

I did not intend to condemn the use of nickel as a cast iron alloy. I thoroughly explained the value of nickel addition in the proper fields, relative to its tendency to increase the specific gravity, to decrease the tendency to growth, and to increase the corrosive resistance against alkali, etc. I condemned only the use of nickel when used to make up for incorrect furnace, and especially cupola, operation.

DR. F. W. MEYER.

National Radiator Corporation,
Johnstown, Pa., April 20.

Compressed Gas Cylinder Manufacture

To the Editor: I have read with interest the article on "High-Strength Structural Steels" in the March 21 issue of *THE IRON AGE*, particularly your concluding notes on compressed gas cylinders. In the remarks on that subject you make the statement that "gas cylinders are made from a circular plate" and then follow with a brief description of the cupping process. This makes no recognition of the fact that an equally large number of cylinders are made by piercing a short billet and then drawing this seamless cup into a cylinder shell by pushing it through a series of dies of decreasing diameter.

In fact the company I represent and which uses the latter process of manufacture is admittedly the one chiefly responsible for the higher manganese, lower carbon cylinder steel you describe. Our product now conforms with the analysis stated by you, and we have been at all times making these cylinders without quenching them, or otherwise subjecting them to a special heat treatment (which is necessary for the higher carbon, lower manganese cylinders in order to induce the physical properties required to pass the Interstate Commerce Commission's Standard test).

JOHN C. MINOR,
Manager Gas Cylinder Sales,
William Wharton, Jr. & Co., Inc.
New York.



Republic to Weld Pipe Electrically

Expansion Program to Cost About \$10,000,000 Includes Capacity for Sizes Up to 22 In.

Elmer T. McCleary, president, Republic Iron & Steel Co., has announced an improvement and expansion program which will involve an expenditure of \$8,000,000 to \$10,000,000, and which will be started at once. The two principal items in this program are the installation of a new steam and power plant for the company's Youngstown properties, and installation of capacity to manufacture steel pipe by the electrical welding method, under the Johnson patents controlled by the Republic company and acquired in the purchase last year of Steel & Tubes, Inc. The whole range of pipe will be covered by this latter development, which is being watched closely by the pipe-making industry because of its possible effect on the lapwelded method.

One machine has been in operation for two months by the company, manufacturing pipe under the Johnson patents, and has proved successful, states Mr. McCleary. Three pipe-making machines are to be installed to manufacture steel tubes. One will make from 3 to 7 in. in diameter, another from 7 to 14 in., and the third from 14 in. to 22 in. It is expected to have the first machine in commercial production within the next 60 days.

The company is now seeking bids for equipment and machinery, and will likely make the installations under direction of its own engineering staff.

Plate Mill to Furnish the Skelp

Republic will utilize the output of its skelp mills and of its universal plate mill for the new tube mill department. Alterations are now being made to the plate mill which will involve enlargement of its productive capacity and will also enable it to roll longer plates.

The Republic company now has three lapweld and three butt-weld pipe mills which will be affected by this improvement.

The company plans to build its new pipe mill plant adjacent to its present tube mills in the Lansingville district of Youngstown, although this location may be changed.

This plant will not affect in any way the properties of Steel & Tubes, Inc., a subsidiary, which operates a number of plants producing small-size tubing.

The Youngstown plants are to be electrified; the blooming mills first. Waste gases from the blast furnaces will be utilized in the boilers, thus effecting savings in fuel costs.

Stevens & Wood, New York, are engineers in charge of the electrification program.

President McCleary pointed out that the company's first quarter financial statement, which shows net profits equivalent to \$3.04 per share of outstanding common stock, after all charges and preferred dividends, reflects the economies which have been instituted by the present management.

Strip Tin Plate Being Developed

He further announced that important developments are under way involving the manufacture of strip tin plate, but that the commercial practice is not yet fully perfected. This change will bring about economies in the production of tin plate and will be far sweeping.

At the directors' meeting last week all officers were reelected.

Directors declared regular dividends for the first quarter of \$1 per share on common stock, payable June 1 to holders of record May 11, and \$1.75 on preferred, payable July 1 to stock of record June 12. Net profits applicable to dividends for the quarter were \$2,877,127.28. After payment of preferred and common stock dividends, the surplus for the quarter was \$1,635,059.28.

Unfilled orders on hand March 31 were 425,569 tons against 405,929 tons on Dec. 31.

The Youngstown Sheet & Tube Co. is developing plans for installation of steel tube manufacturing capacity by the electrical welding method, at both Youngstown and Chicago plants. The company is well fortified with seamless tube capacity, having a German-type pilger mill and an American high-speed automatic mill at the Campbell plant. It also has a smaller seamless tube mill at the Chicago property.

Davison Company Leases Furnaces

Acquires Cherry Valley Stack of Hanna Furnace Co. and Claire Furnace of Reliance Coke & Furnace Co.

THE Davison Coke & Iron Co., Pittsburgh, has taken over on long term leases the Cherry Valley blast furnace plant of the Hanna Furnace Co. at Leetonia, Ohio, and the Claire blast furnace of the Reliance Coke & Furnace Co. at Sharpsville, Pa. The company now operates the Sharpsville stack at Sharpsville, Pa., and late in May it will blow in the enlarged and rebuilt Neville Island, Pittsburgh, furnace, which was purchased last year from the American Steel & Wire Co. This will give the Davison three of the six potentially active merchant-owned furnaces in the Shenango and Mahoning valleys and the only merchant stack in the Pittsburgh district. The other Valley furnaces are the stack of the Struthers Iron & Steel Co. at Struthers, Ohio, and the two furnaces of the Shenango Furnace Co. at Sharpsville. The Youngstown Sheet & Tube Co. also produces merchant iron at its two Hubbard, Ohio, furnaces. All of these Valley furnaces are now operating.

The Claire furnace was built in 1869 and was last rebuilt in 1921-22. It has recently been producing iron at a rate of about 15,000 tons monthly. The Cherry Valley stack was last rebuilt in 1924 and has recently been producing about 13,000 tons of iron

monthly. With the Sharpsville stack producing about 12,000 tons monthly and the output of the Neville furnace expected to be at least 18,000 tons, the Davison company will have a practical capacity of approximately 58,000 tons a month, or almost 700,000 tons annually.

By the end of the year the company expects to have 70 by-product coke ovens operating at the Neville Island plant, which will produce enough coke to supply three of its furnaces. The recently acquired stacks will be operated in conjunction with the Neville Island and Sharpsville plants and operations will be in direct charge of A. M. Kennedy, works manager of the Davison company.

George D. Buckwell will continue as sales manager of the company and George Johnson, who has been in charge of the Pittsburgh office of the Hanna company, and W. S. Scott, who has been in charge of sales for the Reliance organization, will join the Davison company in the sale of iron under Mr. Buckwell's direction. George S. Davison is president of the company; Allen S. Davison, vice-president and treasurer, and A. P. Meyer, vice-president and secretary.

Schedule of the next instalments of the Business Analysis and Forecast, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, follows: May 2—activity in Steel Consuming Industries; May 16—Position of Iron and Steel Producers.

Iron and Steel Markets

Mill Output Restricted by Steel Supply

Dearth of Semi-Finished Material Results in General Adoption of
Advanced Prices—Sales of Ingots—Mill Equipment
Shows Strain of Operations

WITH the steel industry bending all its efforts to produce, operations continue at a peak rate, being restricted only by the strain on equipment and the shortage of semi-finished material.

While specifications now tend to fall short of shipments, they have shown no marked decline and in some instances have made fresh gains. Deliveries, which are a good measure of the flow of shipping orders, show little improvement.

With no curtailment in automobile production and with other important steel-consuming lines taking steel at a better rate than usual, any slackening in the present pace of the steel mills is likely to be gradual. Heavy operating schedules until well into June are virtually assured.

Although the backlogs of mills in most steel centers are no longer expanding, exception must still be made for the Chicago district, where a continued excess of specifications over shipments has caused further delays in deliveries. Chicago ingot output has declined to 98 per cent of capacity because of the wear and tear of operations which, for some units, have been 5 to 10 per cent above practical rating.

The advance to \$36 a ton on billets, slabs and sheet bars announced by the leading interest last week has become general. Few producers, however, have semi-finished material to sell. Pittsburgh mills have rejected offers of \$37 for sheet bars for immediate shipment. At least two producers that are ordinarily able to supply their own steel requirements have been forced to place orders for ingots—the first important purchases of that class of material in several years.

In face of the dearth of raw steel, 25,000 tons of sheet bars has been sold for shipment to Japan. This apparent incongruity is probably explained by the fact that a leading American producer maintains a regular allotment of steel for export, from which the Japanese tonnage will doubtless be supplied.

A gain of 85,000 tons in unfilled orders in March, reported by independent sheet mills, was in keeping with the expectations of the trade. The increase in February was 50,000 tons. While mill backlogs are no longer increasing, specifications at second quarter prices are beginning to be received as shipments against previous contracts are being completed. Some mills are committed through the second quarter on automobile body sheets and have taken orders for forward shipment subject to third quarter prices. An inquiry for a round tonnage of hot strip for delivery in the next quarter has been put out by a maker of parts for low-priced automobiles.

In line with the firmness in full finished sheets, extras on metal furniture grades have been advanced. Prices on other finishes are slowly becoming better

established, but concessions on black and galvanized have not disappeared.

In plates and shapes, also, deviations from 1.95c., Pittsburgh, are still reported, but the extra for copper-bearing material has been increased from \$2 to \$3 a ton. Similarly the extra for copper-bearing spikes and tie plates has been raised \$1 a ton.

Three pipe makers have shared in the steel for a second gas line to St. Louis, totaling 75,000 tons. Of that amount, 55,000 tons was placed with the Milwaukee pipe maker. This company, which has been the sole fabricator of pipe by electric welding, now has a competitor in the Republic Iron & Steel Co., which is offering sizes up to 7-in. and is about to install equipment to extend the range to 22-in.

Fabricated structural steel orders in March, computed at 358,050 tons, established a new monthly record. Awards for the week, at 34,000 tons, were considerably below recent totals, but a large amount of structural work is awaiting decision.

The Canadian National has placed orders for 2000 automobile cars with American shops. The Great Northern has bought 6000 tons of rails and the Nickel Plate has exercised an option on several thousand tons.

The New York Shipbuilding Co. is low bidder on three vessels for the Export Steamship Corporation, requiring 27,000 tons of steel.

The opening of the season of navigation was signaled by shipments of ore from the Upper Lakes, steel bars from Cleveland to Detroit and pig iron from Buffalo to Chicago. A cargo of low phosphorus pig iron was loaded in England April 5 for ultimate delivery at Milwaukee.

The pig iron market is devoid of significant new developments. Northern and Eastern furnaces continue to take a stronger price position, while Southern furnaces remain on the aggressive. A New Jersey pipe plant has received a substantial part of 20,000 tons of iron bought from Tennessee and Alabama furnaces.

Heavy melting scrap at Pittsburgh has declined 25c. a ton to \$18.50. Old material is easier in virtually all markets.

Government cooperation with steel manufacturers in research to broaden markets is among the pre-election promises of the Conservative Party in Great Britain. An inquiry into the possibility of protection for iron and steel has also been promised.

The International Tube Cartel, which now includes American manufacturers, will regulate trade in gas, water and oil pipe. An agreement on locomotive and boiler tubes has not yet been reached.

THE IRON AGE composite price for pig iron has advanced from \$18.46 to \$18.54 a ton. Finished steel remains at 2.412c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
No. 2 foundry, Philadelphia..	\$21.76	\$21.76	\$21.76	\$20.76
No. 2, Valley furnace.....	18.00	18.00	18.00	17.25
No. 2, Southern, Cin'ti.....	18.69	18.69	19.19	19.69
No. 2 Birmingham.....	15.50	15.50	15.50	16.00
No. 2 foundry, Chicago*.....	20.00	20.00	20.00	18.50
Basic, del'd eastern Pa.....	20.25	20.25	20.25	19.50
Basic, Valley furnace.....	18.00	18.00	17.50	17.00
Valley Bessemer, del'd P'gh..	20.26	20.26	20.26	19.26
Malleable, Chicago*.....	20.00	20.00	20.00	18.50
Malleable, Valley.....	18.50	18.50	18.50	17.25
Gray forge, Pittsburgh.....	19.26	19.26	19.26	18.51
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04
Ferromanganese, furnace.....	105.00	105.00	105.00	100.00

Rails, Billets, Etc., Per Gross Ton:	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00
Light rails at mill.....	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh..	36.00	34.00	34.00	33.00
Sheet bars, Pittsburgh.....	36.00	35.00	35.00	34.00
Slabs, Pittsburgh.....	36.00	34.00	34.00	33.00
Forging billets, Pittsburgh.....	41.00	39.00	39.00	38.00
Wire rods, Pittsburgh.....	42.00	42.00	42.00	44.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.85	1.85	1.85	1.85

Finished Steel,	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.95	1.95	1.90	1.85
Bars, Chicago.....	2.05	2.05	2.05	2.00
Bars, Cleveland.....	1.95	1.95	1.95	2.04
Bars, New York.....	2.25	2.29	2.24	2.19
Tank plates, Pittsburgh.....	1.95	1.95	1.90	1.85
Tank plates, Chicago.....	2.05	2.05	2.05	2.00
Tank plates, New York.....	2.22½	2.22½	2.17½	2.17½
Structural shapes, Pittsburgh..	1.95	1.95	1.90	1.85
Structural shapes, Chicago.....	2.05	2.05	2.05	2.00
Structural shapes, New York.....	2.19½	2.19½	2.14½	2.14½
Cold-finished bars, Pittsburgh..	2.30	2.30	2.20	2.20
Hot-rolled strips, Pittsburgh..	1.90	1.90	1.80	2.05
Cold-rolled strips, Pittsburgh..	2.75	2.75	2.75	3.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel,	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh....	2.85	2.85	2.85	2.75
Sheets, black, No. 24, Chicago	3.05	3.05	3.05	2.85
dist. mill.....	3.60	3.60	3.60	3.65
Sheets, galv., No. 24, P'gh....	3.80	3.80	3.80	3.70
Sheets, galv., No. 24, Chicago	2.10	2.10	2.10	2.00
dist. mill.....	2.30	2.30	2.30	2.15
Wire nails, Pittsburgh.....	2.65	2.65	2.65	2.65
Wire nails, Chicago dist. mill..	2.70	2.70	2.70	2.70
Plain wire, Pittsburgh.....	2.50	2.50	2.50	2.50
Plain wire, Chicago dist. mill..	2.55	2.55	2.55	2.55
Barbed wire, galv., P'gh.....	3.30	3.30	3.30	3.35
Barbed wire, galv., Chicago	3.35	3.35	3.35	3.40
dist. mill.....	\$5.35	\$5.35	\$5.35	\$5.25
Tin plate, 100 lb. box, P'gh...				

Old Material, Per Gross Ton:	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
Heavy melting steel, P'gh....	\$18.50	\$18.75	\$18.50	\$15.25
Heavy melting steel, Phila....	17.00	17.00	16.50	13.50
Heavy melting steel, Ch'go....	16.00	16.00	15.75	13.00
Carwheels, Chicago.....	14.50	14.50	14.50	13.50
Carwheels, Philadelphia.....	15.50	15.50	15.50	15.50
No. 1 cast, Pittsburgh.....	15.50	15.50	15.25	14.50
No. 1 cast, Philadelphia.....	16.50	16.50	16.00	16.00
No. 1 cast, Ch'go (net ton)...	16.00	16.00	16.00	14.00
No. 1 RR. wrot., Phila.....	16.00	16.00	16.00	15.00
No. 1 RR., wrot., Ch'go (net)	14.00	14.00	14.00	11.50

Coke, Connellsville,	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
Per Net Ton at Oven:				
Furnace coke, prompt.....	\$2.75	\$2.75	\$2.90	\$2.60
Foundry coke, prompt.....	3.75	3.75	3.75	3.75

Metals,	Apr. 23, 1929	Apr. 16, 1929	Mar. 26, 1929	Apr. 24, 1928
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	18.12½	18.12½	24.12½	14.25
Electrolytic copper, refinery..	17.75	17.75	23.75	14.12½
Tin (Straits), New York.....	44.75	45.62½	48.75	52.62½
Zinc, East St. Louis.....	6.60	6.65	6.60	5.82½
Zinc, New York.....	6.95	7.00	6.95	6.17½
Lead, St. Louis.....	6.85	6.85	7.65	6.00
Lead, New York.....	7.00	7.00	7.75	6.10
Antimony (Asiatic), N. Y. ..	9.50	9.75	9.75	10.12½

Pittsburgh

Semi-Finished Steel Shortage Brings General Price Advance —No Slowing Down in Plant Operations

PITTSBURGH, April 23.—Interest in the steel market the past week has centered in the shortage of semi-finished material. Following an advance last week in billet and sheet bar prices to \$36, Pittsburgh, mills in this district have declined offers of \$37. Non-integrated steel companies are still able to secure their needs on what is virtually a week-to-week basis, and the shortage has not yet resulted in any serious curtailment in operations. At least two companies have purchased steel ingots in the open market. Steel works operations are being continued at about the rate which has prevailed for several weeks. The leading interest has put on three blast furnaces in the last 10 days, while one independent steel company furnace has been blown out for relining. Forty-three steel works furnaces are operating in the Pittsburgh district, compared with 37 at this time last year.

Tin plate mills owned by independent companies are operating at practical capacity, while the leading interest has been forced to curtail operations slightly because of a fire in one of its plants.

New business and specifications on second quarter contracts have improved slightly the last week, compared with the first two weeks of the month. In some products this improvement has enabled mills to add slightly to their commitments, but

generally shipments are still somewhat larger in volume than new business. Based on present conditions, any slowing down in operations would be very gradual and would permit satisfactory mill schedules until well into June. With no report of curtailment in automobile production and with other important consuming lines taking steel at a better rate than usual, tangible indications of any immediate downward trend in output in this district are lacking.

Sheet prices are slowly becoming better established, but it is still necessary to quote a range of \$2 a ton to represent the market adequately. On blue annealed sheets, one maker with orders sufficient for two or three months' operations is quoting 2.25c., Pittsburgh, or a premium of \$1 a ton over the present usual market price. In line with the firmness of the market for full finished sheets, extras on the metal furniture grades have been advanced.

Pig Iron.—While the higher asking prices on Valley pig iron have been generally adopted by all makers, they have so far applied only on some small orders. A number of fairly large tonnages which were pending when the price advance was announced were closed at the old prices. Melters of foundry iron are believed to be well covered for their nearby needs, hence the higher prices may not receive a severe enough test to establish them fully until two or three weeks have elapsed. On basic iron, the new \$18.50 quotation has not been tested, although an inquiry for 3000 to 5000 tons of this grade which has just come out may clarify the price situation. A few sales of malleable

and Bessemer have been made at \$19, Valley. Iron is moving into consumption at a satisfactory rate, but consumers are showing little interest in third quarter requirements. Steel foundries are in a favorable position with regard to operations, but large users of foundry iron are contracting for their requirements in a guarded manner.

Prices per gross ton, f.o.b. Valley furnace:
 Basic\$18.00 to \$18.50
 Bessemer 18.50 to 19.00
 Gray forge 17.50 to 18.00
 No. 2 foundry 18.00 to 18.50
 No. 3 foundry 17.50 to 18.00
 Malleable 18.50 to 19.00
 Low phos., copper free.... 26.50 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Semi-finished Steel.—The acute shortage of semi-finished steel has resulted in higher prices. Makers have advanced billets and slabs \$2 a ton and sheet bars \$1 a ton, the general quotation in the three products now being \$36, Pittsburgh or Youngstown. This price is only nominal, however, as there seems to be no material to be had, and an offer of \$37 for immediate delivery of sheet bars was refused by local mills during the week. Whether third quarter contracts will be based on the new price is likely to depend largely upon conditions in the industry as the end of the quarter approaches. Non-integrated mills are still having about as much trouble getting steel as they have had during the last several weeks, while mills with adequate open-hearth capacity are adjusting their finishing facilities to conserve steel for the most urgent requirements. At least two companies with ordinarily adequate open-hearth capacities have been forced to purchase steel ingots during the last week. Demand for wire rods is improving and the price seems well established at \$42, base.

Bars, Plates and Shapes.—New business during the last week was considerably ahead of the first two weeks of the month and compared favorably with the best weeks in March. Some companies again find incoming business exceeding shipments by a comfortable margin, and delivery promises on bars have been extended to four or five weeks. Business in plates and shapes has also improved, but part of this is probably traceable

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes...	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.55c.
Blue ann'd sheets (No. 10), 1 to 10 sheets	3.45c.
Galv. corrug. sheets (No. 28), per square	\$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black soft ann'd, base per 100 lb.	\$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

to large orders from car builders in this district. Fabricating shops are operating at a fair rate, but backlogs are small. Pending work is increasing, and prospects for the remainder of the quarter look good. The extra on copper-bearing plates and shapes has been increased from \$2 to \$3 per ton. Otherwise the price situation is unchanged. Concessions from 1.95c., base Pittsburgh, price still occur on plates and shapes and less frequently the price is shaded on bars.

Rails and Track Supplies.—Demands for track supplies continue to improve and conditions are more favorable than they have been for three years. Coincident with the increase of the extra for copper-bearing plates and shapes, the extra on copper-bearing spikes and tie plates has been advanced \$1 a ton.

Wire Products.—Wire business has shown some improvement during the last week or 10 days. Manufacturers' wire is moving steadily and the demand from jobbers for wire fencing and barbed wire has improved. Some jobbers are requiring early shipments, and such requests are usually fore-

runners of more active business. The nail market still lags, but makers are beginning to accept this as a diminishing rather than a dull market. Prices are steady and unchanged.

Tubular Goods.—Standard butt-welded pipe for building work is beginning to show more life, but makers expect the movement into this channel will be smaller than usual this year. Demand for oil country pipe is not active, but mill operations are at a fair rate and there is considerable work in prospect. Shipments of mechanical tubing to the automobile industry continue at a high rate, and there is an excellent demand for boiler tubes.

Sheets.—Mill operations are at near capacity, and, in some cases, new business is larger than shipments. Delivery promises average about four weeks, and the chief concern of mills is to make shipments as promised. The shortage of sheet bars in the Pittsburgh and Youngstown districts is being met successfully by most makers. Mills representing a large majority of the capacity are holding to 3.70c. and 2.95c., Pittsburgh, on galvanized and black sheets, but one or two important factors in the market continue to take business at concessions of \$1 to \$2 a ton. Blue annealed sheets are better established at 2.20c., Pittsburgh, and one mill with orders sufficient for two or three months' operation is quoting 2.25c. New extras have been announced on metal furniture sheets.

Tin Plate.—Operations approached nearer to capacity during the last week, with the leading producer operating at about 94 per cent. However, a fire at this company's Farrell, Pa., works seriously crippled that plant, and it cannot be operated at more than 33 per cent of capacity for some time. Independent mills are running at fully 98 per cent of capacity. Frosts reported from different parts of the country may curtail canning operations slightly, but there is nothing to indicate that the year will not see a record production of tin plate.

Cold-Finished Steel Bars.—The last week was a better one than the first two weeks of the month, but new busi-

THE IRON AGE Composite Prices

Finished Steel

April 23, 1929, 2.412c. a Lb.

One week ago.....	2.412c.
One month ago.....	2.391c.
One year ago.....	2.355c.
10-year pre-war average.....	1.689c.

Based on steel bars, beams, tank plates, wire, nails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High		Low
1929	2.412c., Apr. 2:	2.391c., Jan. 8	
1928	2.391c., Dec. 11:	2.314c., Jan. 3	
1927	2.453c., Jan. 4:	2.293c., Oct. 25	
1926	2.453c., Jan. 5:	2.403c., May 18	
1925	2.560c., Jan. 6:	2.396c., Aug. 18	

Pig Iron

April 23, 1929, \$18.54 a Gross Ton

One week ago.....	\$18.46
One month ago.....	18.38
One year ago.....	17.67
10-year pre-war average.....	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low
1929	\$18.54, Apr. 9:	\$18.29, Mar. 19	
1928	18.59, Nov. 27:	17.04, July 24	
1927	19.71, Jan. 4:	17.54, Nov. 1	
1926	21.54, Jan. 5:	19.46, July 13	
1925	22.50, Jan. 13:	18.96, July 7	

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel		Base per Lb.
F.o.b. Pittsburgh mill.....	1.95c.	
F.o.b. Chicago.....	2.05c. to 2.15c.	
Del'd Philadelphia.....	2.27c.	
Del'd New York.....	2.29c.	
Del'd Cleveland.....	1.95c. to 2.00c.	
F.o.b. Cleveland.....	1.95c. to 2.00c.	
F.o.b. Lackawanna.....	2.05c.	
F.o.b. Birmingham.....	2.15c.	
C.i.f. Pacific ports.....	2.35c.	
F.o.b. San Francisco mills.....	2.35c. to 2.40c.	

Billet Steel Reinforcing		
F.o.b. Pittsburgh mills, 40, 50, 60-ft.....	2.00c.	
F.o.b. Pittsburgh mills, cut lengths.....	2.25c.	
F.o.b. Birmingham, mill lengths.....	2.15c.	

Rail Steel		
F.o.b. mills, east of Chicago dist.....	1.85c.	
F.o.b. Chicago Heights mill.....	1.95c.	
Del'd Philadelphia.....	2.27c.	

Iron		
Common iron, f.o.b. Chicago.....	2.05c. to 2.10c.	
Refined iron, f.o.b. P'gh mills.....	2.75c.	
Common iron, del'd Philadelphia.....	2.12c.	
Common iron, del'd New York.....	2.14c.	

Tank Plates

Base per Lb.		
F.o.b. Pittsburgh mill.....	1.95c.	
F.o.b. Chicago.....	2.05c.	
F.o.b. Birmingham.....	2.15c.	
Del'd Cleveland.....	2.14c.	
Del'd Philadelphia.....	2.15c.	
F.o.b. Coatesville.....	2.05c.	
F.o.b. Sparrow Point.....	2.05c.	
F.o.b. Lackawanna.....	2.05c.	
Del'd New York.....	2.22 1/2 c.	
C.i.f. Pacific ports.....	2.20c. to 2.30c.	

Structural Shapes

Base per Lb.		
F.o.b. Pittsburgh mill.....	1.95c.	
F.o.b. Chicago.....	2.05c. to 2.15c.	
F.o.b. Birmingham.....	2.15c.	
F.o.b. Lackawanna.....	2.05c.	
F.o.b. Bethlehem.....	2.05c.	
Del'd Cleveland.....	2.14c.	
Del'd Philadelphia.....	2.01c. to 2.06c.	
Del'd New York.....	2.14 1/2 c.	
C.i.f. Pacific ports.....	2.35c.	

Hot-Rolled Hoops, Bands and Strips

Base per Lb.		
6 in. and narrower, P'gh.....	2.00c.	
Wider than 6 in., P'gh.....	1.90c.	
6 in. and narrower, Chicago.....	2.20c.	
Wider than 6 in., Chicago.....	2.10c.	
Cooperage stock, P'gh.....	2.20c.	
Cooperage stock, Chicago.....	2.30c.	

Cold-Finished Steel

Base per Lb.		
Bars, f.o.b. Pittsburgh mill.....	2.30c.	
Bars, f.o.b. Chicago.....	2.30c.	
Bars, Cleveland.....	2.35c.	
Shafting, ground, f.o.b. mill.....	2.65c. to 3.60c.	
Strips, P'gh.....	2.75c. to 2.85c.	
Strips, Cleveland.....	2.75c. to 2.85c.	
Strips, del'd Chicago.....	3.05c. to 3.15c.	
Strips, Worcester.....	2.90c. to 3.00c.	
Fender stock, No. 20 gage, Pitts- burgh or Cleveland.....	4.25c. to 4.35c.	

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

Base per Keg		
Wire nails.....	\$2.65 to \$2.75	
Galvanized nails.....	4.65 to 4.75	
Galvanized staples.....	3.35 to 3.45	
Polished staples.....	3.10 to 3.20	
Cement coated nails.....	2.65 to 2.75	

Base per 100 Lb.		
Bright plain wire, No. 6 to No. 9 gage.....	\$2.50 to \$2.60	
Annealed fence wire.....	2.65 to 2.75	
Spring wire.....	3.50 to 3.60	
Gal'd wire, No. 9.....	3.10 to 3.20	
Barbed wire, gal'd.....	3.30 to 3.40	
Barbed wire, painted.....	3.05 to 3.15	
Woven wire fence (per net ton to retailers).....	65.00	
Chicago district mill and delivered Chicago prices are \$1 per ton above the foregoing. Bir- mingham mill prices \$3 a ton higher; Worcester, Mass., (wire) mill \$3 a ton higher on produc- tion of that plant; Duluth, Minn., mill \$2 a ton higher; Anderson, Ind., \$1 higher.		

Cut Nails

Per 100 Lb.		
Carloads, Wheeling, Reading or North- umberland, Pa.....	\$2.70	
Less carloads, Wheeling or Reading.....	2.80	

Sheets

Blue Annealed

Base per Lb.		
Nos. 9 and 10, f.o.b. P'gh.....	2.10c. to 2.20c.	
Nos. 9 and 10, f.o.b. Chicago dist.....	2.30c.	
Nos. 9 and 10, del'd Cleveland.....	2.29c. to 2.39c.	
Nos. 9 and 10, del'd Philadelphia.....	2.42c. to 2.52c.	
Nos. 9 and 10, f.o.b. Birmingham.....	2.25c. to 2.35c.	
Nos. 9 and 10, c.i.f. Pacific Coast ports.....	2.725c.	

Box Annealed, One Pass Cold Rolled		
No. 24, f.o.b. Pittsburgh.....	2.85c. to 2.95c.	
No. 24, f.o.b. Chicago dist. mill.....	3.05c.	
No. 24, del'd Cleveland.....	3.04c. to 3.14c.	
No. 24, del'd Philadelphia.....	3.17c. to 3.27c.	
No. 24, f.o.b. Birmingham.....	3.00c. to 3.10c.	
No. 24, c.i.f. Pacific Coast ports.....	3.50c.	

Metal Furniture Sheets		
No. 24, f.o.b. P'gh, No. 1 grade.....	4.00c. to 4.10c.	
No. 24, f.o.b. P'gh, No. 2 grade.....	3.80c. to 3.90c.	

Galvanized

No. 24, f.o.b. Pittsburgh.....	3.60c. to 3.70c.
No. 24, f.o.b. Chicago dist. mill.....	3.80c.
No. 24, del'd Cleveland.....	3.79c. to 3.89c.
No. 24, del'd Philadelphia.....	3.92c. to 4.02c.
No. 24, f.o.b. Birmingham.....	3.75c. to 3.85c.
No. 24, c.i.f. Pacific Coast ports.....	4.25c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh.....	3.00c.
No. 28, f.o.b. Chicago dist. mill.....	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh.....	4.10c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill.....	4.00c.
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Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh.....	3.90c.
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Tin Plate

Per Base Box		
Standard cokes, f.o.b. P'gh district mills.....	\$5.35	
Standard cokes, f.o.b. Gary.....	5.45	

Terne Plate

(F.o.b. Morgantown or Pittsburgh)
(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$11.20	25-lb. coating I.C. \$16.70
15-lb. coating I.C. 14.00	30-lb. coating I.C. 17.75
20-lb. coating I.C. 15.30	40-lb. coating I.C. 19.85

Alloy Steel Bars

(F.o.b. maker's mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.		
S.A.E. Series		Alloy Differential
Numbers		
2000 (1 1/2% Nickel).....		0.25
2100 (1 1/2% Nickel).....		0.55
2300 (3 1/2% Nickel).....		1.50
2500 (5% Nickel).....		2.25
3100 Nickel Chromium.....		0.55
3200 Nickel Chromium.....		1.35
3300 Nickel Chromium.....		3.80
3400 Nickel Chromium.....		3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum).....		0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum).....		0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel).....		1.05
5100 Chromium Steel (0.60 to 0.90 Chromium).....		0.35
5100 Chromium Steel (0.80 to 1.10 Chromium).....		0.45
5100 Chromium Spring Steel.....		0.20
6100 Chromium Vanadium Bars.....		1.20
6100 Chromium Vanadium Spring Steel.....		0.95
9250 Silicon Manganese Spring Steel (flats).....		0.25
Rounds and squares.....		0.50
Chromium Nickel Vanadium.....		1.50
Carbon Vanadium.....		0.95

Above prices are for hot rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 3/4c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2 1/2 in. squares, the price is \$5 a gross ton above the 4 x 4 billet price.

Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a \$5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price.

Band sizes are 40c. per 100 lb. higher.

Rails

Per Gross Ton		
Standard, f.o.b. mill.....	\$43.00	
Light (from billets), f.o.b. mill.....	36.00	
Light (from rail steel), f.o.b. mill.....	34.00	
Light (from billets), f.o.b. Ch'go mill.....	36.00	

Track Equipment

Base per 100 Lb.		
Spikes, 1/2 in. and larger.....	\$2.50	
Spikes, 1/2 in. and smaller.....	2.80	
Spikes, boat and barge.....	3.00	

Tie plates, steel.....	2.15
Angle bars.....	\$2.75
Track bolts, to steam railroads.....	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count.....	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld		Iron	
Inches	Steel	Inches	Black Galv
1/4.....	45	1/4 and 3/4.....	+11 +36
1/4 to 3/4.....	51	1/2.....	23 5
3/4.....	56	3/4.....	28 11
3/4 to 1.....	60	1 and 1 1/4.....	31 15
1 to 3.....	62	1 1/2 and 2.....	35 18

Lap Weld		Butt Weld, extra strong, plain ends	
Inches	Steel	Inches	Black Galv
2.....	55	2.....	23 9
2 1/2 to 6.....	59	2 1/2 to 3 1/2.....	28 13
7 and 8.....	56	4 to 6.....	30 17
9 and 10.....	54	7 and 8.....	29 16
11 and 12.....	53	9 to 12.....	26 11

Lap Weld, extra strong, plain ends		Butt Weld, extra strong, plain ends	
Inches	Steel	Inches	Black Galv
2.....	53	1/4 and 3/4.....	+13 +48
2 1/2 to 4.....	57	1/2.....	23 7
4 1/2 to 6.....	56	3/4.....	28 12
7 to 8.....	52	1 to 2.....	34 18
9 and 10.....	45		
11 and 12.....	44		

Lap Weld, extra strong, plain ends		Butt Weld, extra strong, plain ends	
Inches	Steel	Inches	Black Galv
2.....	53	2.....	29 13
2 1/2 to 4.....	57	2 1/2 to 4.....	34 20
4 1/2 to 6.....	56	4 1/2 to 6.....	33 19
7 to 8.....	52	7 and 8.....	31 17
9 and 10.....	45	9 to 12.....	21 8
11 and 12.....	44		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1 1/2 points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2 1/2%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
Inches	Steel	Inches	Charcoal Iron
2 in. and 2 1/4 in.....	40	1 1/2 in.....	1
2 1/2 in.—2 3/4 in.....	48	1 3/4 in.....	8
3 in.....	54	2 in.—2 1/4 in.....	13
3 1/2 in.—3 3/4 in.....	56	2 1/2 in.—2 3/4 in.....	16
4 in.....	59	3 in.....	17
4 1/2 in. to 6 in.....	48	3 1/2 in. to 3 3/4 in.....	18
		4 in.....	20
		4 1/2 in.....	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn		Hot Rolled	
Inches	Cold Drawn	Inches	Hot Rolled
1 in.....	63	3 in.....	48
1 1/4 to 1 1/2 in.....	55	3 1/2 to 3 3/4 in.....	50
1 3/4 in.....	39	4 in.....	53
2 to 2 1/4 in.....	34	4 1/2, 5 and 6 in.....	42
2 1/2 to 2 3/4 in.....	42		

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List		
Carbon, 0.10% to 0.30%, base (carloads).....	55	
Carbon, 0.30% to 0.40%, base.....	50	
Plus differentials for lengths over 12 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.		

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ness is still somewhat behind shipments, and the end of the month will see a slight reduction in commitments. The movement to the automobile industry continues at an unabated rate, and other consuming lines are drawing heavily on production. The price is unchanged at 2.30c., Pittsburgh.

Bolts, Nuts and Rivets.—Railroad buying has stimulated bolt, nut and rivet makers and operations are being maintained at about 75 per cent of capacity, a rate considerably above the general average. Demand from nearly all consuming lines seems to be steady and prices are well established.

Hot-Rolled Strip.—The past week has been the best of the month, both in new business and specifications on contracts. Shipments are still somewhat ahead of specifications, but continued improvement, such as has been experienced recently, would make possible the accumulation of backlogs. The price situation is considered satisfactory, with new business being placed regularly at 1.90c. or 2c., Pittsburgh, depending upon width.

Old Material.—The easier tone in the scrap market continues, and heavy melting steel has declined 25c. a ton. Similar declines have occurred on other grades, while bundled sheets, sheet bar crops and other acid open-hearth grades are off 50c. On the whole, scrap is still plentiful and some consumers are accumulating material in their yards. Dealers are marking time in an effort to determine the trend of steel mill operations.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:		
No. 1 heavy melting steel.	\$18.25 to	\$18.75
No. 2 heavy melting steel.	16.25 to	16.75
Scrap rails	18.00 to	18.50
Compressed sheet steel.	18.25 to	18.75
Bundled sheets, sides and ends	16.50 to	17.00
Cast iron car wheels.	16.25 to	16.75
Sheet bar crops, ordinary.	18.75 to	19.25
Heavy breakable cast.	13.00 to	14.00
No. 2 railroad wrought.	18.75 to	19.25
Hvy. steel axle turnings.	16.50 to	17.50
Machine shop turnings.	11.25 to	11.75
Acid Open-Hearth Grades:		
Railr. knuckles and couplers	21.00 to	22.00
Railr. coil and leaf springs	21.00 to	22.00
Roller steel wheels.	21.00 to	22.00
Low phos. billet and bloom ends	23.25 to	23.75
Low phos., mill plates.	21.50 to	22.00
Low phos., light grades.	20.50 to	21.50
Low phos., sheet bar crops	21.50 to	22.50
Heavy steel axle turnings.	16.50 to	17.50
Electric Furnace Grades:		
Low phos., punchings	21.00 to	21.50
Hvy. steel axle turnings.	16.50 to	17.50
Blast Furnace Grades:		
Short shoveling steel turnings	12.00 to	13.00
Short mixed borings and turnings	12.00 to	13.00
Cast iron borings.	12.00 to	13.00
Rolling Mill Grades:		
Steel car axles	21.50 to	22.00
Cupola Grades:		
No. 1 cast.	15.25 to	15.75
Rails 3 ft. and under.	20.50 to	21.50

Cold-Rolled Strip.—Mills producing this material are committed well into June, and specifications are coming in at a rate which seems to insure a high operating rate until at least the end of the quarter. Producers are well satisfied with the new card of extras recently introduced and believe that a

fair profit will be returned on business placed at 2.75c., Pittsburgh, plus the new extras.

Coal and Coke.—Furnace coke is still being freely offered at \$2.75 to \$2.85, Connellsville, and there is no perceptible improvement in demand. The H. C. Frick Coke Co. has fired 1050 ovens during the last week, but this is not considered indicative of any improvement in conditions. Foundry coke is still moving to users at a slightly better rate, but there is still considerable room for improvement. Prices are fairly stable on the well established brands of this grade. The coal market is still weak, and the action of the leading producer in reducing wages during the last week has not helped the situation.

Largest Production of Malleable Castings

WASHINGTON, April 23.—Establishing a record, production of malleable castings in March totaled 84,496 tons, representing 88.6 per cent of the capacity of manufacturers reporting to the Department of Commerce. The previous peak output was in March, 1924, with a total of 80,600 tons.

March shipments, amounting to 81,826 tons, also made a record, the previous high total having been in January, 1924, with a total of 77,261 tons. Orders in March aggregated 87,739 tons, and were the next to highest monthly bookings on record, being exceeded only by those of January, 1924, with a total of 88,232 tons.

Production in February was 73,879 tons, with operations at 77.7 per cent of capacity. Shipments in February were 71,114 tons and orders for that month were 78,049 tons.

For the first quarter, production was 231,560 tons, against 196,501 tons for the corresponding quarter of last year. Shipments were 230,138 tons, compared with 187,667 tons. Orders totaled 242,834 tons, compared with 197,035 tons. Operating capacity for the first quarter rose to 81 per cent, against 67.5 per cent during the corresponding period of last year.

Metal Furniture Sheet Extras Increased

Manufacturers of metal furniture sheets have announced new extras, effective at once on all business not under contract, and applying to both No. 1 and No. 2 grades.

On No. 1 grade, full pickled full cold rolled, the extra is 25c. per 100 lb. over ordinary full pickled full cold rolled, or \$1.25 over the black sheet base for No. 17 gage and lighter and \$1 for No. 16 gage and heavier. The former extra on No. 17 gage and lighter was \$1.15.

No. 2 grade, single pickled full cold rolled, is 25c. higher than regular single pickled full cold rolled or 90c. per 100 lb. above the black sheet base

on No. 17 gage and lighter and 75c. over the black sheet base on No. 16 gage and heavier.

Single pickled full cold rolled, No. 17 gage and lighter, are now 65c. above the black sheet base, while No. 16 gage and heavier are 50c. above the black sheet base.

These extras include patent leveling, but not resquaring or oiling.

Heavier Exports of Finished Steel Products

WASHINGTON, April 23.—Exports of iron and steel products from the United States in March totaled 270,925 gross tons, an increase of 11,214 tons over those for February, which amounted to 259,711 tons, and imports were 52,622 tons, a decrease of 5524 tons from incoming shipments in February, according to preliminary figures of the Iron and Steel Division, Department of Commerce.

For the first quarter of 1929, exports aggregated 804,932 tons, an increase of 191,410 tons, or 31.3 per cent over exports for the corresponding period of last year. Imports, on the other hand, totaled only 165,601 tons during the three months of 1929, against 182,081 tons in the first quarter of 1928, a decline of 16,480 tons or 9.1 per cent.

The marked improvement in the volume of exports resulted from increased shipments of finished products, scrap exports having declined 23,356 tons in 1929 as compared with the first quarter of last year.

Reduces Coal Mine Wages

The Pittsburgh Coal Co., Pittsburgh, has announced wage reductions averaging about 6 per cent. Other coal companies in the Pittsburgh district have cut wages since the first of the year, while the last cut of the Pittsburgh Coal Co. was made in January, 1928. In announcing the reduction, J. D. A. Morrow, president of the company, stated that the move was made necessary in order to meet competition of West Virginia companies which have made at least three wage cuts since Jan. 1. With the reduction effective, the minimum outside labor wage of the Pittsburgh company is \$4 a day.

Greater Shipments of Mining and Industrial Locomotives

WASHINGTON, April 22.—Mining and industrial electric locomotives to the number of 207, valued at \$1,248,071, were shipped during the first quarter, against 133, valued at \$728,629, for the corresponding period of last year, according to the Department of Commerce. The recent shipments were the largest for any quarter since the first three months of 1927, when 283 units valued at \$1,372,225 were shipped. In the last quarter of 1928 the total was 184 units, valued at \$1,149,678.

Chicago

Strain on Equipment From Heavy Operations Slows Down Western Output of Steel

CHICAGO, April 23.—Ingot output in this district has declined several points because of the physical strain which has resulted from operations of some units at 5 to 10 per cent above their practical rating. The general average this week is near 98 per cent of capacity. This week's sales were the sixth in point of volume since the beginning of the year, and specifications far outdistance shipments, with the result that deliveries continue to become further delayed. If April shipments fall short of those in March it will be because of necessary repairs and not because of lack of orders. In fact, present order books would dictate heavier shipments if it were possible to increase the rate of rolling. The supply of raw steel is still a deciding factor in the scheduling of various mill departments. Deliveries are now less favorable to the buyer than at any time this year, and conditions indicate little or no improvement in the near future.

Consumers are pressing harder for deliveries as per schedules, giving proof to the impression gained last week that they have exhausted their reserve supplies and that practically their full current needs must be drawn from present rolling schedules. Some new business bears earmarks of being entered for putting into stock, but, on the whole, new purchases cannot be said to be speculative. Buyers who are receiving steel on contracts have in many instances specified their second quarter tonnages in full, and are relying on the mills to provide for their needs as fast as mill rollings will permit.

Prices for plates, shapes and bars are steady at 2.05c. to 2.15c. a lb., Chicago. There are exceptions both above and below these figures. The market is not free from shipments against contracts at lower prices, while on the other hand 2.20c. is growing more common on mixed and less desirable orders for small tonnages.

Ferroalloys.—Shipments of these commodities are heavy. Inquiry is dull. Sales are in unusually small volume.

Prices delivered Chicago: 80 per cent ferromanganese, \$112.56; 50 per cent ferrosilicon, \$83.50 to \$88.50; spiegel-eisen, 19 to 21 per cent, \$40.76.

Pig Iron.—Forward buying of Northern foundry iron is assuming greater prominence. Inquiry of that kind is more widespread, and some contracts have been closed, not alone for the third quarter but also for the last half. Spot buying is unusually brisk, running close to the rate of a year ago, when producers' order books were not over 60 per cent of their present size. Boat iron is on its way to Chicago. The steamship *Peterson* left Buffalo harbor late last week and is due to arrive at Chicago before the end of this week. The *Gilchrist* was loaded April 5 in England with low phosphorus iron for ultimate delivery at Milwaukee. Another interest is arranging for a cargo to be delivered to consumers in Chicago and vicinity. Tonnages of boat iron are being offered at \$19.50 a ton for the base grade, and silicon differentials are being waived in part. Several sales of silvery total 1200 tons. Prices for this grade are steady. Southern iron, even at price advantages to outlying points

in the Chicago district, is moving in small volume.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil.	1.75 to 2.25	..\$20.00
N'th'n No. 1 fdy., sil.	2.25 to 2.75	.. 20.50
Malleable, not over 2.25 sil.	.....	20.00
High phosphorus	.....	20.00
Lake Super. charcoal, sil.	1.50	..... 27.04
So'th'n No. 2 fdy. (all rail)	..\$21.01 to 21.51	
Low phos., sil. 1 to 2, copper free	..	29.50
Silvery, sil. 8 per cent	.....	30.79
Bess. ferrosilicon, 14-15 per cent	...	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Fluorspar.—This commodity is moderately steady at \$18 a net ton, Illinois mines. Several sizable inquiries are before the local trade.

Plates.—Contracts for a second gas line into St. Louis have been placed with three pipe fabricators. Of the 75,000 tons of pipe needed about 55,000 tons will be shipped by the Milwaukee maker. Orders from oil producing centers are light. A Chicago tank fabricator has ordered 1800 tons of plates for an oil storage project which has developed in the Southwest. Several oil refiners are said to be planning for additional tanks, but inquiries have not yet come into the market. Western car builders are making heavier drafts against commitments at mills. A large tonnage remains to be specified for car contracts that have been on builders' books for many weeks. Chicago plate mills are engaged at capacity and demand is unusually broad. Specifications are fully as large as last week and deliveries on many sizes are not better than early June.

Bars.—Consumers continue to exert pressure for delivery of mild steel bars. Forgers are engaged at capacity, and, as judged by shipping schedules from Chicago mills, there is no change in the rates of output either of parts makers or automobile manufacturers. Tractor manufacturers in many instances are sold far ahead of their ability to make deliveries and they are allocating their product among buyers. Farm implement manufacturers as a whole are heavily engaged. The slack which was caused by lessened demand for tillage machinery has been taken up by the production of equipment which is to

be delivered in the spring and summer months. New buying in iron bars is quiet, but specifications against old orders are unusually heavy. Alloy steel bars are in large demand. As a general rule, users are without stocks and are dependent on current shipments for their immediate needs. Specifications for rail steel bars are measurably heavier and for the first time in many weeks are well ahead of production. The needs of barn equipment manufacturers and bed makers are heavier, while specifications from farm implement producers are somewhat lighter. Deliveries on bars range from two to three weeks and on tubing three to four weeks. Prices remain steady at 1.95c. a lb., Chicago Heights.

Structural Material.—This market continues to drag. Prices obtained by fabricators are not above the low level of the winter months. Employment in some shops is lower, and some fabricators who entered the spring months with fair backlogs now are finding that new work is urgently needed if the present rate of output is to be maintained to the end of the month. Fresh inquiry gives more promise than a week ago. A highway bridge in Iowa will take 3000 tons and a railroad bridge in Illinois calls for 1500 tons. Several other inquiries range from 500 to 800 tons each.

Mill prices on plain material, per lb.: 2.05c. to 2.15c. base, Chicago.

Wire Products.—Wire mills, producing at 70 per cent of capacity, are maintaining satisfactory deliveries on practically all commodities. This rate of output, a trifle heavier than that afforded in recent weeks, is made necessary by larger demands from the jobbing trade. Mill stocks are smaller than at the turn of the month, but to date a good balance has been maintained. April shipments are a shade heavier than the rate in March. Demand from the manufacturing trade is steady. Jobbers in most parts of the country are encouraged by a reduction of stocks and a more rapid turnover. They now are coming to mills for replenishments. Orders for nails are sluggish, and it is estimated that shipments are not much above 40 per cent of deliveries a year ago. Railroads have been making small purchases of woven wire fencing. Reinforcing mesh is moving in large volume; the use of this commodity is rapidly increasing.

Cold-Rolled Strip.—Spot purchases of this commodity are active. Prices are firm. Operations are at capacity, and deliveries are not better than four to six weeks.

Rails and Track Supplies.—More than 14,000 tons of rails have been ordered from Chicago mills. The Nickel Plate has exercised an option for 3000 tons and is said to have placed other tonnages with mills in the East. The Great Northern has placed orders for 6000 tons. Frog and switch manufacturers have sold about 5000 tons of these products. Fresh inquiry is light, being confined to several miscellaneous lots of 500 to 1000 tons each for trac-

tion companies in the Middle West. Purchases of track supplies are small; inquiry is scattered and for small individual tonnages. The light rail market is without feature. Rail mills are operating as close to capacity as the available supply of raw steel will permit.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess, rails, \$43; light rails, rolled from billets, \$36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.15c.; angle bars, 2.75c.

Sheets.—Chicago mills are well sold for about 60 days, with operations at 75 per cent of capacity. This limit in output is set by the availability of sheet bars. Specifications from the roofing trade are larger. Purchases at going quotations are numerous.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 3.10c.; No. 24 galv., 3.85c.; No. 10 blue ann'l'd, 2.35c. *Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.*

Old Material.—Trends in the Chicago scrap market are no more certain now than a week ago. Consumers of the heavy tonnage grades are firmly resisting the prices asked. A week ago sellers wanted \$17 a ton for heavy melting steel, delivered in consumers' yards. Mills at the time offered \$16.50. Today brokers are willing to take the latter figure, but they find that buyers' best offers are \$16 a ton. Consumers' positions are strengthened by a more liberal supply of scrap. In fact, some tracks are overburdened with incoming shipments and several mills have limited shipments. One buyer has threatened to place an embargo on incoming scrap. Several round tonnages of cast iron borings have been placed at \$11 a gross ton, delivered. It appears that some interests are selling short in anticipation that lower prices will prevail before the delivery dates. Production of cast iron borings in the immediate Chicago district is adequate for all current needs. Iron axles are scarce, but there is evidence that the major consumers have adequate stocks on hand, a move that is necessary for the reason that this grade can seldom be had in a hurry; in the absence of interest by buyers,

sellers are now willing to take 50c. a ton less than they asked a week ago. Shipments of railroad and industrial scrap are heavy. Railroad lists offered this week include 6500 tons by the St. Paul and 4400 tons by the Burlington.

Prices deliv'd Chicago district consumers:
Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$16.00 to \$16.50
Shoveling steel.....	16.00 to 16.50
Frogs, switches and guards, cut apart, and misc. rails	17.50 to 18.00
Hydraul. compressed sheets	14.25 to 14.75
Drop forge flashings.....	11.50 to 12.00
Forg'd cast and r'l'd steel carwheels.....	19.00 to 19.50
Railroad tires, charg. box size.....	19.00 to 19.50
Railroad leaf springs cut apart.....	19.00 to 19.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	17.50 to 18.00
Coil springs.....	20.00 to 20.50
Electric Furnace Grades:	
Axle turnings.....	16.50 to 17.00
Low phos. punchings.....	18.00 to 18.50
Low phos. plates, 12 in. and under.....	17.50 to 18.00
Blast Furnace Grades:	
Axle turnings.....	11.25 to 11.75
Cast iron borings.....	10.50 to 11.00
Short shoveling turnings.....	10.50 to 11.00
Machine shop turnings.....	7.50 to 8.00
Rolling Mill Grades:	
Iron rails.....	16.00 to 16.50
Rerolling rails.....	17.50 to 18.00
Cupola Grades:	
Steel rails less than 3 ft.....	19.25 to 19.75
Steel rails less than 2 ft.....	20.25 to 20.75
Angle bars, steel.....	17.50 to 18.00
Cast iron carwheels.....	14.50 to 15.00
Malleable Grades:	
Railroad.....	19.25 to 19.75
Agricultural.....	16.25 to 16.75
Miscellaneous:	
*Relaying rails, 56 to 60 lb.....	23.00 to 25.00
*Relaying rails, 65 lb. and heav.....	26.00 to 31.00

Per Net Ton	
Rolling Mill Grades:	
Iron angles and splice bars	15.00 to 15.50
Iron arch bars and transoms.....	21.50 to 22.00
Iron car axles.....	27.00 to 27.50
Steel car axles.....	17.50 to 18.00
No. 1 railroad wrought.....	14.25 to 14.75
No. 2 railroad wrought.....	14.25 to 14.75
No. 1 busheling.....	12.25 to 12.75
No. 2 busheling.....	7.00 to 7.50
Locomotive tires, smooth.....	14.50 to 15.00
Pipes and flues.....	10.00 to 10.50
Cupola Grades:	
No. 1 machinery cast.....	16.00 to 16.50
No. 1 railroad cast.....	15.50 to 16.00
No. 1 agricultural cast.....	14.50 to 15.00
Stove plate.....	12.75 to 13.25
Grate bars.....	13.50 to 14.00
Brake shoes.....	12.50 to 13.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Cast Iron Pipe.—With many municipal elections out of the way in Illinois and Indiana, sellers are looking for a more active market in these States. Purchases by public utilities are confined to car lots. However, they are drawing liberally against old contracts. Industrial plants are inactive in this market and needs of the railroads are confined to small tonnages for scattered water treating plants. Contractors in this district are in need of work and competition for going jobs is unusually keen. Notable among awards is 985 tons of 12-in. Class B pipe for Chicago, which was taken by the Glamorgan Pipe & Foundry Co. at \$45 a ton, delivered, or \$36.80 a ton, Birmingham. Flint, Mich., awarded 800 tons of 6 and 8-in. pipe to James B. Clow & Sons. Oshkosh, Wis., placed 180 tons of 6-in. pipe with the American Cast Iron

Pipe Co. The McWane Cast Iron Pipe Co. took 350 tons of 4 and 6-in. Class C pipe for Pewaukee, Wis., and 12,000 ft. of 2 to 6-in. pipe for Mondamin, Iowa. Among fresh inquiries are 2786 tons of 24 to 42-in. Class C pipe for Milwaukee, 50,000 ft. of 2 to 6-in. pipe for Coal City, Ill., and 2200 tons of 6-in. and 1100 tons of 16-in. pipe for Detroit.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$44.20 to \$46.20; 4-in., \$48.20 to \$50.20; Class A and gas pipe, \$3 extra.

Bolts, Nuts and Rivets.—Specifications from the manufacturing trade are a trifle lighter. The railroads, however, continue to take liberal quantities. Output is close to 70 per cent of capacity.

Reinforcing Bars.—Greater activity is noted in awards of lots up to 100 tons each. Business of this character is tending to hold shop operations at a steady output, which, however, is below the rate normally expected at this time of the year. Architects are busy and fresh inquiries are fairly numerous. Prices appear to be a trifle more stable. Reinforcing bars made from billets are more uniformly quoted at 2.40c. a lb. in carloads out of Chicago warehouses. The rail steel commodity is slowly strengthening.

Coke.—Prices remain firm at \$8 a ton, local ovens. Shipments are holding close to the March rate.

High Records in Commercial Steel Castings

WASHINGTON, April 23.—Both orders and output of commercial steel castings established higher tonnages in March, according to reports received by the Department of Commerce from 129 concerns. Orders totaled 130,271 tons and production 114,632 tons, representing 89 per cent and 79 per cent respectively of the monthly capacity of 146,000 tons. March orders were the best since the high record of 172,101 tons, recorded in March, 1923. Orders in February amounted to 115,639 tons. Production was the highest since the record of 115,503 tons, made in March, 1926.

Of the March orders, 60,677 tons was for railroad specialties, representing 90 per cent of that class of capacity, against 58,903 tons or 87 per cent of such capacity in February; while 69,594 tons was for miscellaneous castings, or 89 per cent of such capacity, compared with 56,736 tons or 72 per cent in February.

March output included 43,748 tons of railroad specialties, or 65 per cent of that class of capacity, against 40,282 tons or 60 per cent of such capacity in February, and 70,884 tons of miscellaneous castings, or 90 per cent of such capacity, against 57,286 tons or 73 per cent in February.

For the first quarter orders totaled 370,223 tons, against 266,279 tons for the first quarter of last year, and production amounted to 305,613 tons, against 256,170 tons.

Warehouse Prices, f.o.b. Chicago

Base per Lb.	
Plates and structural shapes.....	3.10c.
Soft steel bars.....	3.00c.
Reinforc'g bars, billet steel.....	2.35c. to 2.40c.
Reinforc'g bars, rail steel.....	1.90c. to 2.05c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Bands (7/8 in. in Nos. 10 and 12 gages).....	3.20c.
Hoops (No. 14 gage and lighter).....	3.75c.
Black sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.65c.
Blue ann'l'd sheets (No. 10).....	3.35c.
Spikes, stand. railroad.....	3.55c.
Track bolts.....	4.55c.
Rivets, structural.....	3.80c.
Rivets, boiler.....	3.80c.
Per Cent Off List	
Machine bolts.....	60
Carriage bolts.....	60
Coach or lag screws.....	60
Hot-pressed nuts, sq., tap. or blank.....	60
Hot-pressed nuts, hex., tap. or blank.....	60
No. 8 black ann'l'd wire, per 100 lb.....	\$3.30
Com. wire nails, base per keg.....	3.20
Cement c'd nails, base per keg.....	3.20

Cleveland

Steel Specifications Are Less Heavy, But Mills Are Still Crowded—Automotive Industry Holds Its Pace

CLEVELAND, April 23.—Specifications for finished steel are not as heavy as earlier in the month, but so far this has not resulted in any improvement in the delivery situation. In fact, some of the mills report that their deliveries have become more extended on steel bars, plates and structural material. On small steel bars, some mills are fully committed for six weeks or longer. While a few consumers are being inconvenienced by their inability to secure steel as needed, most buyers sent in specifications far enough in advance to secure shipments when wanted. Consequently, there is not a great deal of pressure for deliveries. The shortage in semi-finished steel continues, and some consumers are still making efforts to supplement their present supplies. New buying of finished steel is rather light and in small lots.

The automotive industry is continuing production at about the recent rate, the slowing down by a few makers apparently having been offset by a slight increase in output by others. Evidently the industry will maintain its present pace well through the second quarter, although stocks of unsold cars are reported to be large. Other industries in the metal-working field are doing well.

Water shipments of steel to Detroit are again under way. A Cleveland mill shipped considerable tonnage of steel bars during the week, and the first cargo of the season from Buffalo is scheduled to move in a day or two.

While a lull in the building field continues, structural steel is in good demand from both manufacturing plants and fabricators, the latter being fairly busy with small work. The largest recent inquiry is for 8500 tons for a power plant at Ashtabula.

The Nickel Plate Railroad is supplementing its 1929 rail purchases by several thousand tons by exercising an option taken in January, when its 1929 rail orders were placed.

Prices are steady at 1.95c. to 2c., Cleveland, for steel bars and at 1.95c., Pittsburgh, for plates and structural material.

Pig Iron.—The 50c. a ton price advance by Valley Furnaces to \$18.50 for No. 2 foundry iron has given the market a somewhat firmer tone. However, Lake furnace prices are unchanged. Sales by Cleveland interests during the week totaled 16,500 tons in foundry and malleable grades, or slightly more than during the previous week. These were mostly in small lots to fill out second quarter

requirements. Very little inquiry for the third quarter is coming out. The American Steel Foundries is inquiring for 3000 to 5000 tons of basic iron for its Alliance, Ohio, plant for the third quarter. Local furnaces quote foundry and malleable iron at \$18.50 for outside shipment and \$19 for local delivery. Another producer is holding to \$19 for delivery in western Ohio and Indiana. In Michigan, there is a range of \$20 to \$20.50 for foundry iron, depending on the shipping point, and malleable iron is quoted at 50c. a ton higher than foundry. Low phosphorus iron does not show much life, although a few small-lot sales are reported at the quoted prices. Shipping orders show no falling off as compared with March, although some producers will not ship quite as much iron this month as last because their stock piles have been reduced. The M. A. Hanna Co. will cease to be a factor in the Valley pig iron market after May 1, as a result of the lease by the Hanna Furnace Co. of the Cherry Valley furnace at Leetonia, Ohio, to the Davison Coke & Iron Co.

Prices per gross ton at Cleveland:

N'th'n fdy., sil.	1.75 to 2.25	\$19.50
S'th'n fdy., 1.75 to 2.25	.....	\$21.00 to 21.50
Malleable	.....	19.50
Ohio silvery, 8 per cent.	.....	29.00
Basic Valley furnace	.....	18.00 to 18.50
Stand. low phos., Valley	.....	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; \$3 from Jackson, Ohio; \$6 from Birmingham.

Iron Ore.—First ore cargoes of the season were shipped late last week, and all the leading shippers are now getting boats in operation. It is expected that a good movement will be under way by May 1. Ore stocks at furnaces and Lake Erie docks are upward of 4,000,000 tons less than at this time last year. The amount April 1 was 20,005,416 tons, compared with 24,258,754 tons on the same date a year ago, according to the monthly report issued by the Lake Superior Iron Ore Association. Ore consumed in March amounted to 5,465,015 tons, an increase of 646,204 tons over February. In March last year, the amount consumed was 4,808,075 tons. Furnace stocks on April 1 were 15,782,068 tons. Central district furnaces consumed 2,802,620 tons of Lake ore in March, an increase of 351,460 tons over February. Lake front furnaces used 2,446,693 tons, a

gain of 289,073 tons. Eastern furnaces consumed 96,872 tons, a gain of 4340 tons and all-rail furnaces used 118,830 tons, a gain of 1331 tons. There were 183 furnaces in blast using Lake ore on March 31, an increase of five for the month.

Semi-finished Steel.—The leading local interest has followed in the advance of \$2 a ton on billets and \$1 a ton on sheet bars, making both \$36, Cleveland. The advance will not apply to second quarter business, as this mill is fully committed for the remainder of the quarter. However, it is expected that the higher prices will apply to third quarter contracts. Specifications continue very heavy.

Coke.—Ohio by-product foundry coke has been reestablished at \$8.25, Painesville, for May shipment. Foundry coke is moving well in specification against contracts, but there is not much new business. Prices of Connellsville foundry grades are unchanged. By-product domestic coke is inactive. The price is unchanged at \$6, Cleveland.

Strip Steel.—Specifications for hot-rolled strip continue good, although not quite as heavy as recently. While most mills are well filled up for the second quarter, one producer is able to make shipments on wide material in four weeks. There is not much new business. An inquiry is out for a round tonnage for the third quarter from a maker of parts for low-priced automobiles, but mills are not yet quoting for that delivery. Cold-rolled strip is still moving well, but production equals incoming orders and mills can make shipments in from three to six weeks. The market is firm at 2.75c., Cleveland, with the new extras. Small lots are bringing 2.85c., and some makers are getting that price for material in the higher finishes used in the plating industries.

Sheets.—While specifications are not quite as heavy as recently, mills are still entering as much tonnage on their books as they are shipping. Shipments against first quarter contracts are now well cleaned up, and some material is going out at the new prices. Deliveries extend from three to eight weeks, the more extended date being mostly on auto body sheets. Some of the mills that are committed through the second quarter on that grade will take orders for the third quarter subject to third quarter prices. Some business in full finished sheets has been taken for August shipment on that basis. Makers have advanced some grades of iron sheets \$2 to \$5 a ton and are taking third quarter business at the advance. Price irregularities continue, being more in evidence on galvanized sheets than on black and blue annealed.

Wire Products.—A heavy demand has developed for fence. Many jobbers appear to be selling more than they expected to, and their stocks have become exhausted. Good specifications are coming from the manufacturing trade for wire. Nails are do-

Warehouse Prices, f.o.b. Cleveland

Base per Lb.

Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to 14 in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c.
Galvanized sheets (No. 24)	4.25c. to 4.55c.
Blue ann'd sheets (No. 10)	3.25c.
No. 9 ann'd wire, per 100 lb.	\$2.95
No. 9 gal. wire, per 100 lb.	3.40
Com. wire nails, base per keg	2.95

*Net base, including boxing and cutting to length.

ing better than recently, although the seasonal demand is less than normal and prices are weak in some sections.

Warehouse Business.—Jobbers are getting a fair amount of well diversified business, although the volume is less than in March. Prices on galvanized sheets are irregular. Other prices are firm.

Old Material.—Mills continue to take scrap in good volume against contracts, but are not showing much interest in additional commitments, giving as a reason that they are uncertain how long their operations will continue at the present rate. While consumers are buying some small lots of steel-making scrap, they are offering prices that are not attractive to dealers. A local mill is offering \$17 for selected No. 1 heavy melting steel. Compressed sheet steel is not as firm as recently and blast furnace grades lack strength. Dealers are paying \$11.50 to \$11.60 for the latter to fill orders taken recently from a Cleveland mill. No. 1 railroad wrought has

been advanced 50c. a ton. No. 1 cast scrap has become scarce and has also advanced.

Prices per gross ton delivered consumers yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....	\$15.50 to \$16.00
No. 2 heavy melting steel.....	15.00 to 15.50
Compressed sheet steel.....	15.00 to 15.50
Light bundled sheet stampings.....	12.00 to 12.50
Drop forge flashings.....	13.00 to 13.25
Machine shop turnings.....	9.50 to 10.00
No. 1 railroad wrought.....	13.50 to 14.00
No. 2 railroad wrought.....	16.00 to 16.50
No. 1 busheling.....	12.50 to 13.00
Pipes and flues.....	9.00 to 9.50
Steel axle turnings.....	12.50 to 13.00
Acid Open-Hearth Grades	
Low phos., forging crops.....	18.50 to 19.00
Low phos., billet, bloom and slab crops.....	18.50 to 19.00
Low phos. sheet bar crops.....	18.00 to 18.50
Low phos. plate scrap.....	18.00 to 18.50
Blast Furnace Grades	
Cast iron borings.....	11.25 to 11.50
Mixed borings and short turnings.....	11.25 to 11.50
No. 2 busheling.....	11.25 to 11.50
Cupola Grades	
No. 1 cast.....	17.25 to 17.50
Railroad grate bars.....	11.00 to 12.00
Stove plate.....	12.00 to 12.50
Rails under 3 ft.....	16.75 to 17.25
Miscellaneous	
Railroad malleable.....	16.00 to 16.50
Rails for rolling.....	16.25 to 16.50

New York

Japan Buys 25,000 Tons of Sheet Bars—Pig Iron Market Quiet—Scrap Eases

NEW YORK, April 23.—Pig iron demand remains very light, and it is doubtful whether the market will show much activity until buyers issue inquiries for their third quarter requirements. In view of recent advances in prices, melters are showing a minimum of interest in both current and forward deliveries. They are taking heavy shipments, however, and probably plan to postpone the placing of further orders as long as possible. Total sales in this section during the week probably did not exceed 6500 tons. The minimum on Buffalo foundry iron now appears to be \$18, base furnace. A quotation of \$18.50 is more common, and small lots are being placed at \$19. Prices on eastern Pennsylvania iron have undergone few tests in this district, but the asking prices of furnaces have advanced 50c. a ton. The only sizable transaction reported was the purchase of 2000 tons by the New York Air Brake Co. for its Watertown, N. Y., plant. A moderate tonnage of Dutch iron continues to be sold in small lots, and a cargo from Holland is expected to reach Bridgeport, Conn., the latter part of next month. Dutch 1X is quoted at \$22.25, duty paid port of entry. Indian foundry iron, in the base grade, is quoted at \$22, but the deliveries are not available until late May or early June.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25.....	\$22.91 to \$23.91
*Buf. No. 2, del'd east.	
N. J. No. 2.....	21.28 to 22.28
East. Pa. No. 2 fdy., sil. 1.75 to 2.25.....	21.39 to 22.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Price delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Reinforcing Bars.—Current lettings are confined almost entirely to lots of less than 100 tons each. Little new prospective work has appeared, but numerous projects are said to be in a formative stage. Early action is expected on a number of sizable pending jobs, among them the Holland Tunnel Plaza Building, New York, which will take 2000 tons.

Billet steel reinforcing bars in 40, 50 and 60-ft. lengths, 2.05c. per lb., Pittsburgh, and 2.30c. per lb., Pittsburgh warehouse, for cut lengths. Out of New York warehouse, 2.90c. per lb. for lots of 5 tons or more, 3.05c. for lots of 2 to 5 tons and 3.30c. for less than 2 tons, all delivered at job.

Semi-Finished Steel.—A somewhat surprising sale, in view of the prevailing shortage of semi-finished steel, was that of 25,000 tons of sheet bars for shipment to Japan to a Japanese exporting house for the use of a Japanese sheet company. No details were given out as to price or time of delivery, but it is known that one or two steel companies, prior to the advance announced within the past few days, declined to consider business in sheet bars for export even at a premium over the domestic price.

Warehouse Business.—Buying from stock has been decidedly active in the past week, jobbers reporting an increase of sizable orders as a result of the well-filled condition of steel mills. Demand for structural material is particularly good. There is a fair amount of business in black and galvanized sheets.

Finished Steel.—Pressure for shipments of steel bars and sheets and delayed deliveries on plates are the outstanding features of a market situation which is lacking in important new business developments, but which is

fully as active as any in recent weeks when measured by specifications against contracts. Bar mills are having difficulty in getting their customers to specify far enough ahead to insure them proper places on rolling schedules. Many buyers have not outgrown the habit of expecting mills to ship within about two weeks from receipt of specification. Four to five weeks is the common delivery promise

Warehouse Prices, f.o.b. New York

Base per Lb.	
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars.....	3.24c.
Iron bars, Swed. charcoal.....	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.60c.
Flats and squares.....	4.10c.
Cold-roll. strip, soft and quarter hard.....	5.15c. to 5.40c.
Hoops.....	4.25c.
Bands.....	3.75c.
Blue ann'd sheets (No. 10).....	3.85c. to 3.90c.
Long terne sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed.....	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, 1½ x ¼ in. and larger.....	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger.....	3.65c.
Open-hearth spring steel, bases.....	4.50c. to 7.00c.

Per Cent Off List	
Machine bolts, cut thread:	
¾ x 6 in. and smaller.....	60
1 x 30 in. and smaller.....	50 to 50 and 10

Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	60
¾ x 20 in. and smaller.....	50 to 50 and 10

Coach screws:	
¾ x 6 in. and smaller.....	60
1 x 6 in. and smaller.....	50 to 50 and 10

Per 100 Ft.	
Lap welded, 2-in.....	\$17.33
Seamless steel, 2-in.....	20.24
Charcoal iron, 2-in.....	25.00
Charcoal iron, 4-in.....	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
¼-in. butt.....	46	29
¾-in. butt.....	51	37
1-3-in. butt.....	53	39
2½-6-in. lap.....	48	35
7 and 8-in. lap.....	44	17
11 and 12-in. lap.....	37	12

Wrought Iron—	
¼-in. butt.....	5 +19
¾-in. butt.....	11 +9
1-1½-in. butt.....	14 +6
2-in. lap.....	5 +14
3-6-in. lap.....	11 +6
7-12-in. lap.....	3 +16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box....	\$6.45	\$6.20
Charcoal, per Box—		AAA
IC.....	\$9.70	\$12.10
IX.....	12.00	14.25
IXX.....	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating.....	\$10.00 to \$11.00
IC—30-lb. coating.....	12.00 to 13.00
IC—40-lb. coating.....	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

Per Lb.	
Nos. 18 to 20.....	3.80c.
No. 22.....	3.95c.
No. 24.....	4.00c.
No. 26.....	4.10c.
No. 28*	4.25c.
No. 30.....	4.50c.

Sheets, Galvanized

Per Lb.	
No. 14.....	4.40c.
No. 16.....	4.25c.
No. 18.....	4.40c.
No. 20.....	4.50c.
No. 22.....	4.60c.
No. 24.....	4.75c.
No. 26.....	5.00c.
No. 28*	5.25c.
No. 30.....	5.65c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

on bars. Plate deliveries are extended to three or four weeks, whereas a week or so ago some promises of two weeks' shipment were being made. Eastern plate mills are operating at a high rate. Aside from a slight change upward in the extras on metal furniture sheets, the price situation is without feature.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.29c.; plates, 2.22½c.; structural shapes, 2.19½c.; bar iron, 2.14c.

Cast Iron Pipe.—Most sellers of cast iron pressure pipe report less activity than is usual for the spring. Except for a second opening of bids April 24 on about 39,000 tons of 42-in. and 48-in. pipe to be bought by Albany, N. Y., most of the municipal and private inquiry for pipe is limited to lots of less than 100 tons. On about 270 tons of water pipe for Morristown, N. J., the Herbert Kennedy Co., agent for the Pont-a-Mousson works in France, was low bidder, but no award has been made. On about 56 tons of pipe for Newburgh, N. Y., on which the French interest bid, R. D. Wood & Co. were low bidders. Recent quotations on pipe have ranged from \$34 to \$35 per ton, f.o.b. foundry.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$36.60 to \$37.60; 4-in. and 5-in., \$41.60 to \$42.60; 3-in., \$51.60 to \$52.60. Class A and gas pipe, \$3 extra.

Coke.—On standard furnace coke prices are only moderately firm at \$2.75 to \$2.85 per net ton, Connellsville. Standard foundry coke ranges from \$3.50 to \$3.75 per net ton, Connellsville. Special brands of foundry grade are quoted at \$4.85 per net ton, ovens, or \$8.56, delivered to northern New Jersey, Jersey City and Newark,

and \$9.44 to New York and Brooklyn. By-product coke is quoted at \$9 to \$9.40 per net ton, Newark or Jersey City, and \$10.06, New York or Brooklyn.

Old Material.—Although supplies of iron and steel scrap are not excessive, recent limited buying by consumers in eastern Pennsylvania has resulted in a slight depression of the market. No. 1 heavy melting steel is still being bought at \$16 to \$17 per ton, delivered eastern Pennsylvania, by brokers filling old orders. Heavy breakable cast is quoted at \$15.50, delivered to a Harrisburg, Pa., consumer and to a foundry at Florence, N. J. Cast iron carwheels are slightly stronger on the basis of a recent sale to an eastern Pennsylvania user, one broker offering \$15.75 per ton, delivered.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	\$13.35 to \$13.50
Heavy melting steel (yard)	8.25 to 9.75
No. 1 hvy. breakable cast	11.75 to 12.50
Stove plate (steel works)	8.75 to 9.25
Locomotive grate bars	8.75 to 9.25
Machine shop turnings	7.75 to 8.00
Short shoveling turnings	7.75 to 8.00
Cast borings (blast furn. or steel works)	7.00 to 7.25
Mixed borings and turnings	6.75 to 7.00
Steel car axles	19.25 to 19.75
Iron car axles	24.50 to 25.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	11.75
Forge fire	10.50 to 10.75
No. 1 railroad wrought	12.50 to 13.00
No. 1 yard wrought, long	11.50 to 12.00
Rails for rolling	13.50 to 14.00
Cast iron carwheels	12.00 to 12.25
Stove plate (foundry)	9.00 to 9.50
Malleable cast (railroad)	14.00 to 14.50
Cast borings (chemical)	10.50 to 11.00

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	\$17.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	15.00
No. 2 cast (radiators, cast boilers, etc.)	14.50

derstood to have received a substantial part of about 20,000 tons of foundry iron shipped from Tennessee and Birmingham district furnaces.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$21.76 to \$22.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.26 to 22.76
East. Pa. No. 1X	22.76 to 23.26
Basic (del'd east. Pa.)	20.25 to 21.00
Gray forge	20.50 to 21.00
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.79
Va. No. 2X, 2.25 to 2.75 sil.	25.29

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Bars.—Mills are still quoting from four to six weeks delivery on most sizes of bars and have sufficient tonnage on their books to maintain present operations until well toward the end of the quarter. Quotations are firm at 1.95c., Pittsburgh, or 2.27c., delivered Philadelphia.

Shapes.—Most mills are offering deliveries ranging from one week on the larger sizes of beams to three weeks on small shapes. Prices continue at 1.95c. to 2c. per lb., f.o.b. nearest mill to consumer, or, on a basis of Pencoyd, Pa., 2.01c. to 2.06c., delivered Philadelphia. Some substantial shape business is in prospect for three large ships expected to be awarded to the New York Shipbuilding Co. by the Export Steamship Corporation. Upward of 1000 tons of shapes placed by the same shipbuilder was divided between the leading interest and leading independent. This steel is for 12 steel barges for the Erie Railroad.

Plates.—Mills rolling wide plates are maintaining full operation and offering three to five weeks delivery. Slightly earlier shipment is offered by mills rolling only the narrower plates. Quotations are firm at 2.05c., Coatesville, or 2.15c., delivered Philadelphia. Business is well distributed and some substantial new tonnage is in prospect from shipbuilders. Three

Philadelphia

New Steel Orders Small But Mills Are Well Filled—Plate Buying By Shipbuilders Expected

PHILADELPHIA, April 23.—Slackening in new business, which began to appear a fortnight ago, has continued, but steel mill operations show no tendency to decline and contract specifications are sufficient in most instances to assure activity for most of the present quarter. Deliveries range from one to three weeks on shapes, three to five weeks on plates and four to six weeks on sheets and steel bars. Plate mills have some substantial tonnage in prospect for shipbuilding, with award of three large ships expected to be made to the New York Shipbuilding Co., Camden, N. J., by the Export Steamship Corporation. Distributors of reinforcing bars in this district show considerable interest in the new State building code, which the Governor is expected to sign. It permits the use of 100 per cent of rail steel reinforcing bars for concrete construction in Pennsylvania cities of the first class.

Billets.—The advance of \$2 a ton in the price of billets by Pittsburgh mills has not been followed by eastern Pennsylvania producers, which are still quoting \$34 per ton for rerolling and \$39, Pittsburgh, for forging quality. Most makers are practically out of the market for the remainder of this quarter and most consumers are covered by contracts.

Pig Iron.—Although most eastern Pennsylvania furnaces are seeking to maintain the recent advance on foundry iron to \$21.50 per ton, furnace,

consumers have been able to place some tonnage at the former level of \$21 per ton. Current buying is almost entirely in carload lots, users being generally covered on their requirements for the quarter. No purchases of basic have been made in the past week, but one or two eastern Pennsylvania users are expected to buy soon. Southern iron is still being offered in this district, but only a small total tonnage is reported to have been sold to eastern Pennsylvania users. The leading cast iron pipe interest is un-

Warehouse Prices, f.o.b. Philadelphia

Base per Lb.	
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.60c.
Cold-fin. steel, sq. and flats	4.10c.
Steel hoops	3.40c.
Steel bands, No. 12 to ⅜-in., incl.	3.15c.
Spring steel	5.00c.
*Black sheets (No. 24)	4.10c.
†Galvanized sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.25c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

ships for the Export Steamship Corporation, expected to be awarded to the low bidder, the New York Shipbuilding Co., will require about 20,000 tons of plates. A substantial tonnage of plates for 12 Erie Railroad steel barges has been divided by this shipbuilder between the leading interest and leading independent.

Reinforcing Bars.—Reinforcing bars pending award include 4000 tons for the Columbia-Wrightsville, Pa., bridge and 350 tons for the Easton Hospital, Easton, Pa. Billet steel reinforcing bars in 40, 50 and 60-ft. lengths are quoted at 2.05c., Pittsburgh, or 2.37c., delivered Philadelphia, with a \$5 extra for cutting to length. Rail steel reinforcing bars are quoted at 1.95c. per lb., f.o.b. Franklin, Pa., or Tonawanda, N. Y., cut to required length, or 2.27c. per lb., delivered Philadelphia.

Warehouse Business.—Jobbers report orders increasing in size, mills being unable to offer the prompt deliveries which prevailed until recently. Prices are unchanged in this district, but warehouses in the Baltimore district have increased prices \$3 a ton on certain products. Bars, shapes and plates are quoted at 3.25c. per lb., blue annealed sheets at 3.60c. and cold-finished rounds at 3.50c., with flats, squares and hexagons at 4c. per lb., Baltimore. Hoops and bands are 4c. per lb., which is a \$3 a ton increase in the band price only.

Sheets.—Mills are still offering four to six weeks delivery, being well engaged on tonnage for the automobile industry. Although a slight decline in activity among automobile body builders is reported, they are accepting regular deliveries on their contracts. Sheet mills are expecting radio manufacturers to increase their use of steel. Quotations are being maintained at 2.10c. to 2.20c. per lb., Pittsburgh, or 2.42c. to 2.52c., delivered Philadelphia, for blue annealed sheets. Black sheets are quoted at 2.95c., Pittsburgh, or 3.27c., Philadelphia, and galvanized at 3.70c., Pittsburgh, or 4.02c., Philadelphia.

Imports.—In the week ended April 20, 1300 tons of pig iron arrived at this port, of which 1000 tons was from the United Kingdom and 300 tons from the Netherlands. Ore imports consisted of 5350 tons of iron ore from Greece. Steel arrivals were 124 tons of steel bars from Sweden and 30 tons from Germany, 48 tons of billets from Sweden, 1006 tons of iron skelp from France, 423 tons of structural shapes from Germany and 10 tons from the Netherlands and four tons of steel scrap from the United Kingdom.

Old Material.—Eastern Pennsylvania consumers of No. 1 heavy melting steel are still delaying purchases, but No. 2 steel has shown some activity lately, and sales are reported of a sizable tonnage to a consumer at Conshohocken, Pa. Slightly more than \$14.50 per ton has been paid for No. 2 heavy melting steel, but brokers are offering to enter into contracts

at \$14.50 per ton. Low phosphorus scrap is strong, and sales have been made of knuckles and couplers and rolled steel wheels at \$21.25 per ton, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel.	\$17.00 to \$17.50
Scrap T rails.	16.50 to 17.00
No. 2 heavy melting steel.	14.00 to 14.50
No. 1 railroad wrought.	16.00 to 16.50
Bundled sheets (for steel works)	11.50 to 12.00
Hydraulic compressed, new	15.00 to 16.00
Hydraulic compressed, old.	13.00 to 13.50
Machine shop turnings (for steel works)	11.50 to 12.00
Heavy axle turnings (or equiv.)	14.50 to 15.00
Cast borings (for steel works and roll. mill)	11.00 to 11.50
Heavy breakable cast (for steel works)	16.00
Railroad grate bars.	13.00 to 13.50
Stove plate (for steel works)	13.00 to 13.50
No. 1 low phos. hvy. 0.04% and under.	22.00 to 23.00
Couplers and knuckles.	20.25 to 21.25
Roller steel wheels.	20.25 to 21.25
No. 1 blast furnace scrap.	10.00 to 10.50
Wrot. iron and soft steel pipes and tubes (new specific.)	15.50
Shafting	19.00 to 20.00
Steel axles	23.00 to 23.50
No. 1 forge fire.	14.00 to 14.50
Cast iron carwheels.	16.50
No. 1 cast.	16.50 to 17.00
Cast borings (for chem. plant)	15.00
Steel rails for rolling.	17.00 to 17.50

Acquires Morse Chain Co.

The Borg-Warner Corporation has completed negotiations through which it will acquire a part of the Morse Chain Co., Ithaca, N. Y., according to information received as this issue was going to press. Not included in the transaction are the aircraft, adding machine, typewriter and electric clock divisions of the Morse company. The Morse Chain Co. has two plants in the United States, the Ithaca plant with approximately 100 acres of land and 405,000 sq. ft. of floor space, and the Detroit plant, which occupies five acres and has 115,000 sq. ft. of floor space. The product is largely power transmission chains and timing chains such as are used in automobiles.

Ohio Employment at Highest Level Since 1920

Employment in the iron and steel industries of Ohio during March reached the highest level since 1920, the employment index for that month having risen to 106, or 3 points above the February index and 8 points above the March, 1928, index. The increase was shared by 101 of the 166 reporting companies. Average employment during the first quarter of 1929 was 10 points greater than during the same period last year.

In the foundries and drop forgings group the March index of 99 was 9 points higher than the February index and 21 points higher than the March, 1928, index. Employment in machine tool plants in March stood at 128 as against 125 for February. In the materials-handling and power machinery group the March index was 108, or 6 points less than the February index and 14 points greater than the March, 1928, index. Manu-

facturers of electrical machinery, apparatus and supplies reported employment in March at 182, or 18 points less than the February index of 200. Automobile and automobile parts makers showed a March employment index of 129 as against 123 for February.

Figures are taken from the employment bulletin of the Bureau of Business Research of Ohio State University. An average month of 1923 represents 100 on the index.

Capacities for Making Pig Iron and Steel

As of Dec. 31 last, capacities of blast furnaces and steel melting furnaces in the United States have been determined by the American Iron and Steel Institute. Its annual survey gives the following figures, all in gross tons:

Pig iron	50,531,665
Ferroalloys (in blast furnaces)	702,230
Total, blast furnaces	51,233,895
Steel Furnaces	Ingot Castings
Open-hearth, basic	51,389,625 780,175
Open-hearth, acid	1,088,185 693,715
Bessemer converters	8,513,000 49,188
Electric furnaces	741,670 499,450
Crucible furnaces	26,986 2,395
Totals	61,759,466 2,024,923

Blast furnaces show an increase of 723,345 tons (1.45 per cent) on pig iron over the corresponding figures for Dec. 31, 1927, and a reduction of 21,800 tons (3 per cent) on ferroalloys. The net gain of 701,545 tons represents 1.4 per cent.

Steel furnaces show gains in ingot capacity for both basic and acid open-hearth furnaces and Bessemer converters, and in castings capacity for basic open-hearth and electric furnaces. All other items reflect decreases. The ingot increases are 2,151,215 tons (4.39 per cent) in basic open-hearth furnaces, 29,685 tons (2.8 per cent) in acid open-hearth furnaces and 182,000 tons (2.18 per cent) in Bessemer converters. Castings increases are 3448 tons (0.44 per cent) in basic open-hearth furnaces and 28,046 tons (5.95 per cent) in electric furnaces.

Decreases for ingots are 18,600 tons (2.45 per cent) in electric furnaces and 20,600 tons (43.3 per cent) in crucible furnaces. Castings showed decreases as follows: 18,670 tons (2.62 per cent) in acid open-hearth furnaces; 19,185 tons (28.9 per cent) in Bessemer converters; 40 tons (1.65 per cent) in crucible furnaces.

The Barton Steel Co., formerly the Barton Spiderweb System, Chicago, manufacturer of bars and dealer in reinforcing bars, has gone into voluntary receivership. The Chicago Title & Trust Co., Chicago, was named receiver.

Inland Steel Co., Chicago, will move its Wisconsin district sales office to the Bankers Building, Milwaukee, on May 1.

Boston

Small Amount of Third Quarter Pig Iron Business Has Been Booked—Scrap Prices Easier

BOSTON, April 23.—Pig iron sales the past week were in small individual tonnages and in the aggregate did not exceed 3000 tons. Business included a small tonnage of Buffalo iron for deliveries extending into the third quarter. Buffalo iron is generally quoted at \$19 a ton, base furnace, with 50c. differentials. The Mystic Iron Works is doing business at prices equivalent to \$18.50 to \$19 a ton, base, Buffalo furnace. That company has announced that it is prepared to sell low phosphorus iron. Eastern Pennsylvania iron has been advanced 50c. a ton, but comparatively little of it has been sold here during the past two years. There are no inquiries of importance in the market, but furnaces expect another buying movement next month, owing to the fact that foundries by that time will have made large inroads on supplies contracted for.

Foundry iron prices per gross ton deliv'd to most New England points:
 *Buffalo, sil. 1.75 to 2.25...\$22.91 to \$23.91
 *Buffalo, sil. 2.25 to 2.75... 23.41 to 24.41
 East. Penn., sil. 1.75 to 2.25... 25.15
 East. Penn., sil. 2.25 to 2.75... 25.65
 Va., sil. 1.75 to 2.25... 25.21
 Va., sil. 2.25 to 2.75... 25.71
 Ala., sil. 1.75 to 2.25... 21.91 to 24.27
 Ala., sil. 2.25 to 2.75... 22.41 to 24.77

Freight rates: \$4.91 all rail from Buffalo; \$3.65 from eastern Pennsylvania; \$5.21 all rail from Virginia; \$6.91 to \$8.77 from Alabama.
 *All rail rate.

Reinforcing Bars.—Business in the reinforcing bar market the past week was virtually at a standstill. The base price on bars from stock here is 2.66½c. per lb.

Cast Iron Pipe.—Cambridge, Mass., has awarded 100 tons of 6-in. pipe to R. D. Wood & Co. This was the only municipal letting the past week. Providence, R. I., will close bids on April 29 for 250 tons of 12-in. stock, and Chelsea, Mass., on April 26 for 200 tons of 6 to 12-in. Private business is

not as large as recently. Owing to the high cost of borrowing money, municipalities are curtailing on pipe work. Prices on small stock are fairly firm, but on large dimensions are soft. Prices quoted openly on domestic pipe are: 4 in., \$47.60 a ton, delivered common Boston freight rate points; 6 to 12-in., \$43.10 to \$44.10; 16 to 20-in., \$42.10 to \$43.10. The usual \$3 differential is asked on Class A and gas pipe.

Fabricated Steel.—No new prospective business of importance developed the past week. The largest pending job, 1200 tons for the Boston & Maine Railroad hotel in Boston, probably will be closed this week. The New England Structural Co. is the low bidder. Competition among fabricators for business is keen and some low prices have been made recently.

Coke.—Consumption of by-product foundry coke continues on a large scale, with the price unchanged at \$11 a ton, delivered within a \$3.10 freight rate zone. The demand for domestic fuel is exceptionally good for this time of the year, the recent reduction in price having stimulated fresh buying.

Old Material.—A further contraction in the movement of old material

out of New England was noted the past week. Current business is largely confined to heavy melting steel, steel turnings, mixed borings and turnings and forge flashings. For turnings, \$7 a ton, on cars shipping point, is generally the top price, but a small tonnage was sold at \$7.10. One broker is paying \$6.80 a ton on cars for mixed borings and turnings, but otherwise the trade quotes such material at \$6.25 to \$6.50, off 25c. a ton. No. 1 heavy melting steel has declined 25c. to 50c. a ton, and forge flashings are down as much, while forge scrap and shafting have dropped 50c. a ton. Exporters are still in the market for automobile scrap for Danzig delivery.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	\$12.00 to \$12.50
Scrap T rails	12.25 to 12.50
Scrap girder rails	11.25 to 11.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 yard wrought	9.50 to 10.00
Machine shop turnings	6.75 to 7.00
Cast iron borings (steel works and rolling mill)	6.75 to 7.00
Bundled skeleton, long	9.50 to 10.50
Forge flashings	10.25 to 10.50
Blast furnace borings and turnings	6.25 to 6.50
Forge scrap	9.00 to 9.50
Shafting	14.00 to 14.25
Steel car axles	17.00 to 17.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	10.75 to 11.00
Rolls for rolling	12.50 to 13.00
Cast iron borings, chemical	10.00 to 10.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$14.50 to \$15.00
No. 1 machinery cast	16.00 to 16.50
No. 2 machinery cast	14.00 to 14.50
Stove plate	11.50 to 12.00
Railroad malleable	17.50 to 18.00

St. Louis

Structural Steel Activity Increasing—Pig Iron Sales in Fair Volume—Scrap Strong

ST. LOUIS, April 23.—Sales of pig iron during the week were only fair, the St. Louis Gas & Coke Corporation's total having been 3000 tons, all for shipment during second quarter. A leading Southern maker sold 350 tons at \$15.50, base Birmingham. Northern iron continues firm at unchanged prices, and there are some third quarter inquiries, including 1500 tons for an Illinois manufacturer. The Granite City sales during the week included 1000 tons to a radiator manufacturer, 250 tons each to an Illinois and Indiana melter; 300 tons to a northern Illinois equipment manufacturer, all foundry iron, and 500 tons of malleable to one Illinois manufacturer and 250 tons to another.

Prices per gross ton at St. Louis:
 No. 2 fdy., sil. 1.75 to 2.25, f.o.b.
 Granite City, Ill.\$20.00
 Malleable, f.o.b. Granite City... 20.50
 N'th'n No. 2 fdy., deliv'd St. Louis... 22.16
 Southern No. 2 fdy., deliv'd...\$19.42 to 19.92
 Northern malleable, deliv'd... 22.16
 Northern basic, deliv'd... 22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Coke.—The demand for domestic coke is light because of warm weather. Foundry coke is in good demand, and is scarce. Furnace

grades are moving steadily and in volume.

Finished Iron and Steel.—The contract for the first of a number of large structural projects which are being considered was awarded this week. It was an office building at Twelfth and Olive streets, 4700 tons of structural steel going to Mississippi

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.
	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	3.95c.
Boiler rivets	3.95c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-press. nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

Valley Structural Steel Co. The building also will require 450 tons of reinforcing bars, not yet awarded. Blue annealed sheets and plates continue the most active items reported by the Granite City Steel Co., which is six to seven weeks behind on the former and seven on the latter. The galvanized sheet situation has improved, but in some sections where competition is keen some price cutting is reported.

Old Material.—The market for old material continues strong, with only a few changes in prices. Mills in the district bought heavily during the week, and indications are for a continuance of buying. While receipts from country yards have been light, shipments from railroads have been heavy, good weather enabling the cleaning up of all sales heretofore made to dealers. Current lists are light and include: Burlington, 4965 tons; Chicago & Alton, 1260 tons; Cotton Belt, 600 tons; and Frisco

Lines and Nashville, Chattanooga & St. Louis, each 15 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shovelling steel	13.75 to 14.25
No. 2 heavy melting or shovelling steel	13.00 to 13.50
No. 1 locomotive tires	15.00 to 15.50
Miscel. stand-sec. rails including frogs, switches and guards, cut apart	15.50 to 16.00
Railroad springs	17.50 to 18.00
Bundled sheets	10.00 to 10.50
No. 2 railroad wrought	13.75 to 14.25
No. 1 busheling	10.00 to 10.50
Cast iron borings and shoveling turnings	9.50 to 10.00
Iron rails	15.00 to 15.50
Rails for rolling	16.00 to 16.50
Machine shop turnings	8.25 to 8.75
Heavy turnings	10.00 to 10.50
Steel car axles	19.75 to 20.25
Iron car axles	28.00 to 28.50
Wrot. iron bars and trans.	22.25 to 22.75
No. 1 railroad wrought	14.00 to 14.50
Steel rails, less than 3 ft.	17.00 to 17.50
Steel angle bars	15.00 to 15.50
Cast iron carwheels	15.00 to 15.50
No. 1 machinery cast	16.00 to 16.50
Railroad malleable	16.00 to 16.50
No. 1 railroad cast	15.00 to 15.50
Stove plate	13.50 to 14.00
Agricult. malleable	15.00 to 15.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

Birmingham

Steel Mills Operating at 83 Per Cent Rate—Pig Iron Continues to Sell at \$15 for Outside Shipment

BIRMINGHAM, April 23.—Pig iron sales have been a little better during the past few days, with more melters placing orders for May and June requirements. Spot orders, however, still constitute a fair portion of the iron being sold. Some iron continues to be sold to outside points at \$15, but district prices remain on the basis of \$15.50 for No. 2 foundry. April shipments so far have been below the same number of days in March. Some furnaces report shipments equal to make, while others report additions to stocks. Of the 18 active furnaces, nine are on foundry, eight on basic and one on re-carburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	\$15.50
No. 1 fdy., 2.25 to 2.75 sil.	16.00
Basic	15.50

Finished Steel.—April promises to be the best month of the year, so far, if new business holds at the rate of the past three weeks. Operations last week were about 83 per cent of ingot capacity. This represents an increase during the past three months of about 20 per cent, which is even more significant when it is considered that rail production in the district has been below normal this year. Structural shapes and bars are the leading items in the new business booked this month. Shipments are heavy. Prices are unchanged and firm. New orders of structural steel fabricators total more than 6300 tons. The Virginia Bridge & Iron Co. has an order for 3000 tons for the Southern Bell Telephone & Telegraph Co. building at Atlanta; 1400 tons for seven airplane hangars in South America;

1300 tons for a highway bridge at Knoxville, Tenn.; 200 tons for an airplane hangar at Yucatan, Mexico, and 200 tons for an airplane hangar at Long Island City, N. Y. Reinforcing bar mills are receiving a good volume of small-lot orders in the 25 to 75-ton range. Open-hearth operations are unchanged. The Tennessee Company has seven on at Fairfield and seven at Ensley and the Gulf States Steel Co. has five on at Alabama City.

Cast Iron Pipe.—New business of pressure pipe manufacturers has been made up of a fair number of small orders. Inquiries are a little better, but the projects are small. Increases in shipments this month have brought the total above the current output. Base prices remain at \$37 and \$38. The soil pipe market is still below normal.

Coke.—Shipments are equal to output. The base price of \$5 for both spot and contract coke is unchanged.

Old Material.—The market is generally quiet and new business is much below normal for this season. There was an increase in scrap steel rail business during the past week, but this was the only item to show activity of any consequence. Quotations are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	\$12.50
Scrap steel rails	13.00
Short shovelling turnings	9.00
Cast iron borings	9.00
Stove plate	13.00
Steel axles	21.00
Iron axles	23.00
No. 1 railroad wrought	\$10.00 to 10.50
Rails for rolling	14.00 to 15.00
No. 1 cast	14.00 to 14.50
Tramcar wheels	13.00 to 14.00
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem.	13.50 to 14.00

Canada

Structural Steel Leads in Market Activity

TORONTO, ONT., April 23.—The high rate of operations is reflected in the demand for and production of iron and steel, which continue to make new high monthly records. The production of pig iron in Canada in March, as reported by the Dominion Bureau of Statistics, amounted to 86,176 gross tons. This output, while 8 per cent under the total of 93,939 tons reported for February, was the greatest tonnage for any March since 1918, and exceeded by 10 per cent the output of 78,390 tons of March, 1928. Production of foundry iron advanced to 7958 tons from 5947 tons in February; while basic iron dropped to 74,070 tons from 82,835 tons in the previous month, and malleable iron declined to 4148 tons from 5157 tons in February. First quarter production of pig iron in Canada amounted to 267,879 gross tons, an increase of 29 per cent over the 208,087 tons reported for the corresponding three months of 1928.

Pig Iron.—Sales gained slightly during the week, with spot demand again holding a dominating position. Future delivery contracting continues dull, but the spot demand is strong. Melters are placing frequent repeat orders, mostly in good tonnages. Following the advance of 50c. per ton, which went into effect a couple of weeks ago, prices have again shown an upward tendency, with Toronto distributors now reporting a range of prices, the maximum representing a further advance of 50c. on some business. Montreal prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$24.10 to \$24.60
No. 2 fdy., sil. 1.75 to 2.25	24.10 to 24.60
Malleable	24.10 to 24.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$25.50 to \$26.00
No. 2 fdy., sil. 1.75 to 2.25	25.50 to 26.00
Malleable	25.50 to 26.00
Basic	24.50 to 25.00
Imported Iron, Montreal Warehouse	
Summerlee	\$33.50
Carron	33.00

Structural Steel.—The prospective demand for structural steel shows little or no falling off. Announcements of building programs continue to come from all parts of Canada and in many instances involve the erection of buildings in the skyscraper class. Bridge construction also creates an active demand. Among the larger bridge projects is one to cost \$3,000,000 to be erected at St. John, N. B., by the Canadian National Railways, connecting West St. John with the city proper. Monsarratt & Pratley, 511 St. Catharine street, Montreal, Que., have been appointed engineers for this project.

Old Material.—Melters are showing more interest in the market and a few of the larger consumers have been buying more heavily, with iron grades holding first place. Small purchases

of heavy melting steel are reported from consumers in the Hamilton and Montreal districts, but otherwise the steel scrap demand is practically at a standstill. Producers and holders of scrap are throwing larger tonnages on the market. Dealers' yards are fairly well stocked. Prices are firm but unchanged.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	\$9.50	\$8.50
Rails, scrap.....	11.00	9.00
No. 1 wrought.....	9.50	12.00
Machine shop turnings.....	7.50	5.00
Boiler plate.....	7.50	6.00
Heavy axle turnings.....	8.00	7.50
Cast borings.....	7.50	5.00
Steel turnings.....	7.50	6.50
Wrought pipe.....	5.50	6.00
Steel axles.....	15.00	20.00
Axles, wrought iron.....	17.00	22.00
No. 1 machinery cast.....	17.00	17.00
Stove plate.....	13.00	13.00
Standard carwheels.....	14.00	16.00
Malleable.....	14.00	13.00

Per Net Ton	
No. 1 mach'y cast.....	\$16.00
Stove plate.....	9.50
Standard carwheels.....	14.00
Malleable scrap.....	14.00

Two Large Steel Casting Companies to Merge

Upon completion of negotiations now under way, the Commonwealth Steel Co., Granite City, Ill., capitalized at \$10,000,000, is expected to be merged with the General Steel Casting Corporation, Philadelphia, which is building a new plant at Eddystone, Pa. As noted in THE IRON AGE (Jan. 10, page 160 and Feb. 14, page 493), the latter company was recently organized by three American companies: The American Steel Foundries, Chicago; the Baldwin Locomotive Works, Eddystone, and the American Locomotive Co., New York. The new plant is to cost more than \$10,000,000.

Commonwealth stockholders last week received a letter from their board of directors in which it was stated that the company has been approached as to unification with the General Steel Casting Corporation "on a basis, if consummated, which will be advantageous to you." The letter stated that the board was unanimously in favor of the unification. It was signed by a committee comprising: Clarence H. Howard, president; Harry M. Pfleger, senior vice-president, and Harrison Hoblitzelle, vice-president and sales manager. Further details of the proposed merger were withheld. It is understood that a new company, to be known as the Commonwealth Steel Co., will be formed to own the assets of the two merged firms. It is stated that operations at Granite City will probably be expanded.

One of the late achievements of the Granite City company is the perfection of a process of casting a locomotive bed, including saddles and cylinders, in one piece, eliminating bolts, nuts, screws and joints, and consequent loosening of the frame. Pouring of such a casting in one piece is a difficult task. The Eddystone plant was started to produce, first of all, similar castings for locomotives.

Cincinnati

Concessions on Southern Iron Have Not Resulted in Much Business—Sheet Mills Still at Capacity Rate

CINCINNATI, April 23.—Pig iron continues dull and indications are that the market will be quiet during the remainder of the month. Consumers are taking iron on current contracts at a good rate, but are not yet ready to place orders for delivery beyond June 30. Southern iron is being quoted at \$15 to \$15.50, Birmingham, the former price applying to orders for 1000 tons or more. Despite the fact that Southern furnaces are said to have accumulated large stocks and therefore are pushing their Northern agents for immediate sales, little business has been closed recently in the district bordering on and north of the Ohio River. Meanwhile, Northern foundry iron remains firm at from \$18.50 to \$19, base furnace.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$20.39 to \$20.89
Ala. fdy., sil. 1.75 to 2.25	18.69 to 19.19
Ala. fdy., sil. 2.25 to 2.75	19.19
Tenn. fdy., sil. 1.75 to 2.25	19.19
S'th'n Ohio silvery, 8 per cent	27.89 to 28.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Coke.—By-product foundry coke will be unchanged in price during May at \$6, Connellsville, or \$10.05, delivered Cincinnati. The present schedule of by-product domestic coke also will be undisturbed next month. Beehive foundry coke from the Wise County and New River districts is moving fairly well.

Old Material.—There has been little activity the past week. Trading among dealers has been in fair volume, but scrap users have shown little interest. With liberal stocks on their yards and with some material still due on current contracts, district steel plants are well taken care of for at least 30 days. Heavy melting steel is selling at slightly less than it did a week ago, and borings and turnings continue to lag.

Finished Material.—Demand for bars, structural shapes and plates has been sustained at a satisfactory

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinfrc. bars.....	3.15c.
Rail steel reinfrc. bars.....	3.00c.
Hoops.....	4.05c.
Bands.....	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares.....	4.35c.
Black sheets (No. 24).....	3.90c.
Galvanized sheets (No. 24).....	4.75c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	3.85c.
Small rivets.....	.65 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg.....	2.95
Cement c't'd nails, base 100 lb. keg.....	2.95
Chain, per 100 lb.....	8.75
Net per 100 Ft.	
Lap-weld steel boiler tubes, 2-in.....	\$16.00
4-in.....	33.00
Seamless steel boiler tubes, 2-in.....	17.00
4-in.....	34.00

level and has come from almost all consuming lines. Fabricators are fairly well engaged, but, lacking backlogs, are depending on current orders for the maintenance of present operating schedules. Sheet steel bookings have been on a par with output, which is being held at 100 per cent of capacity by district mills. Sheet prices are steady and unchanged. Rail steel bars are quoted at from 1.90c. to 1.95c., base mill by a local producer.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$13.50 to \$13.75
Scrap rails for melting.....	13.75 to 14.25
Loose sheet clippings.....	9.75 to 10.25
Bundled sheets.....	10.75 to 11.25
Cast iron borings.....	9.00 to 9.50
Machine shop turnings.....	8.50 to 9.00
No. 1 busheling.....	10.75 to 11.25
No. 2 busheling.....	7.00 to 7.25
Rails for rolling.....	14.50 to 15.00
No. 1 locomotive tires.....	14.25 to 14.75
No. 2 railroad wrought.....	13.50 to 14.00
Short rails.....	18.50 to 19.00
Cast iron carwheels.....	12.75 to 13.25
No. 1 machinery cast.....	19.25 to 19.75
No. 1 railroad cast.....	15.25 to 15.75
Burnt cast.....	10.50 to 11.00
Stove plate.....	10.50 to 11.00
Brake shoes.....	10.50 to 11.00
Railroad malleable.....	15.50 to 16.00
Agricultural malleable.....	14.50 to 15.00

Detroit

Automobile Production at Record Pace

DETROIT, April 23.—Automobile production is holding the record pace begun earlier in the year, with a number of companies still making all-time records.

The Chevrolet Motor Co. broke all-time monthly records in March, with an output of 147,274 units, compared with 133,657 in March, 1928. The total for the quarter—354,701 units—also is a record.

The Chrysler Corporation shipped 122,758 cars during the quarter, compared with 112,977 a year ago. The Chrysler plants are working on a full 5-day week basis, with a number of departments on a 6-day basis.

The Willys-Overland Co. intimates that the original schedule of 36,000 units for April will probably be exceeded.

Total General Motors production showed an increase of 11.4 per cent for March for this year over the same month last year. The total figure for March was 220,391 units.

The Marmon Motor Car Co. entered the month with unfilled orders for 5973 cars on its books. Production in this plant is held at 250 units a day, and will continue at this rate for the remainder of the month.

Production of airplanes by the Stout Airplane Division, Ford Motor

Co., is expected to be advanced in the near future to one a day.

Production of the Eureka Vacuum Cleaner Co. has been speeded up about 50 per cent, with a further increase probable before the end of the month. April production in this plant will probably show a 75 per cent increase over that of April, 1928.

During the past week a reduction of 25c. a ton has been recorded on heavy melting and shoveling steel, hydraulic compressed sheets and sheet clippings. Other prices are unchanged.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$14.25 to \$14.75
Borings and short turnings	9.00 to 9.50
Long turnings	7.75 to 8.25
No. 1 machinery cast	14.50 to 15.00
Automobile cast	16.00 to 16.50
Hydraul. comp. sheets	13.75 to 14.25
Stove plate	9.50 to 10.00
No. 1 busheling	11.00 to 11.50
Sheet clippings	9.75 to 10.00
Flashings	12.50 to 13.00

Inland Steel Co. Earnings Gain; Other Reports

First quarter earnings of the Inland Steel Co. were in excess of those for the corresponding period in 1928, according to L. E. Block, chairman of board. In the first quarter of last year the company reported a net income, after all charges except employees' pension fund, of \$2,291,442. These earnings were equivalent to \$1.79 a share on 1,182,799 shares of common stock then outstanding, after dividend requirements on 100,000 shares of 7 per cent preferred stock, which was retired on April 1, 1928. At present the outstanding capital consists of 1,200,000 shares of common stock.

Chicago Pneumatic Tool Co. and its subsidiaries report for the quarter ended March 31 net profits of \$325,301, equal, after preferred dividends, to 89c. a share on the common stock outstanding. This compares with a net of \$155,929, or \$1.65 a share, earned on the 94,427 shares outstanding in the first quarter of last year. There are now 199,469 shares of common stock outstanding.

Ross Gear & Tool Co. reports for the quarter ended March 31, 1929, a net income of \$245,531 after taxes, depreciation and other charges, equal to \$1.63 a share on the 150,000 shares of common stock outstanding. This is compared with \$1.39,452, or 93c. a share, for the corresponding quarter last year. Net operating profits before taxes, but after depreciation, totaled \$279,012 in the first quarter, an increase of 76 per cent over a year ago.

Acme Steel Co.'s first quarter was the best three-month period in the history of the company. Net earnings for the first three months of 1929 totaled \$738,034 equal to \$2.87 a share on the present capitalization, as compared with \$460,576 or \$1.67 a share on the same basis for the first quarter of last year. Earnings this year represent an increase of 71.1 per cent.

Buffalo

Steel Mills and Blast Furnaces Operating at Capacity Rates —Pig Iron Firm—Scrap Quieter

BUFFALO, April 23.—More interest is apparent this week in the pig iron market. There has been some additional inquiry and buying for the third quarter. The Eastern price situation, so far as the Buffalo furnaces are concerned, is stronger, and it is doubted here that lower than \$18.50, Buffalo, can be done by Eastern buyers on rail shipments. One furnace interest reports rejecting several orders it could have obtained by making a price under \$18.50. Current inquiries include one for 1000 tons and another for 1500 tons of malleable; also one for 500 tons of foundry. The New York Air Brake Co. is believed to have bought the pig iron it recently inquired for. Iron will begin to move on the State barge canal in a short time. Buffalo furnaces are operating at their highest production point in years, with 14 of the 16 stacks in the district in blast.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$18.50 to \$19.50
No. 2X fdy., sil. 2.25 to 2.75	19.00 to 20.00
No. 1 fdy., sil. 2.75 to 3.25	20.00 to 21.00
Malleable, sil. up to 2.25	19.00 to 20.00
Basic	17.50 to 18.50
Lake Superior charcoal	27.28

Finished Iron and Steel.—Continued heavy operation is the outstanding feature of the local situation. Bethlehem's Lackawanna plant is operating 23 out of 24 open-hearths, with all of the mills on double time; the Donner Steel Co. is operating eight of its nine open hearths; the Seneca Iron & Steel Co. and the Wickwire-Spencer Steel Corporation are at close to capacity operation, and the Buffalo Bolt Company is in good production. Prices are well maintained on all rolled steel products. Wire business is exceptionally good. Warehouse business is taking on greater activity as the mills lengthen their deliveries. Structural fabricators report many small jobs, but no sizable tonnage.

Old Material.—The scrap market is quieter. There has been no buying of No. 1 heavy melting steel by consumers, but dealers continue to pay \$17.25 to \$17.50 on old orders. The specialties are very active, and there have been numerous sales of knuckles and couplers, rolled steel wheels and coil and leaf springs. Malleable is not quite so strong as a week ago, but there has been some selling at

the quoted prices. Stove plate is a little softer and the demand for No. 1 machinery cast scrap has dropped off. A railroad list last week brought nearly \$18, Buffalo, for the No. 1 heavy melting steel. A shortage of short steel rails, 3 ft. and under, is reported. Consumption of scrap by the mills continues at the same rate as during the past few weeks. One mill last week moved its first shipments this season of hydraulic compressed sheets by boat from Detroit. Two vessels brought a total of about 10,000 tons of this material.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	\$17.50 to \$17.75
No. 2 heavy melting steel	14.75 to 15.00
Scrap rails	17.00 to 18.00
Hydraul. comp. sheets	14.75 to 15.00
Hand bundled sheets	12.00 to 12.50
Drop forge flashings	14.00 to 14.50
No. 1 busheling	16.50 to 16.75
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	7.75 to 8.00
No. 1 railroad wrought	13.50 to 14.00
Acid Open-Hearth	
Knuckles and couplers	19.50 to 20.00
Coil and leaf springs	19.50 to 20.00
Rolled steel wheels	19.50 to 20.00
Low phos. billet and bloom ends	20.00 to 20.50
Electric Furnace Grades	
Short. shov. steel turnings	12.00 to 12.50
Blast Furnace Grades	
Short mixed borings and turnings	11.50 to 12.50
Cast iron borings	11.50 to 12.25
No. 2 busheling	10.00 to 10.50
Rolling Mill Grades	
Steel car axles	18.75 to 19.25
Iron axles	21.00 to 22.00
Cupola Grades	
No. 1 machinery cast	16.00 to 17.00
Stove plate	13.50 to 14.00
Locomotive grate bars	13.50 to 14.00
Steel rails, 3 ft. and under	19.50 to 20.00
Cast iron carwheels	14.00 to 14.50
Malleable Grades	
Industrial	19.75 to 20.00
Railroad	19.75 to 20.00
Agricultural	19.50 to 20.00
Special Grades	
Chemical borings	14.00 to 14.50

Central Alloy to Spend Million for Improvements

An important program of improvements has been started by the Central Alloy Steel Corporation, Massillon, Ohio. A substantial portion of an expenditure of \$1,000,000 is for expansion plans in connection with the manufacture of Krupp Nirosta stainless alloy steels. As a part of this program, the company is constructing, at a cost of \$245,000, a new induction reclaiming furnace, which will be placed in operation about July 1 and which will permit the reclaiming of stainless steel scrap without the loss of chromium and some other alloys. Such reclaiming of valuable alloys has become a factor of increasing importance with the broadening use of stainless steel. Other improvements will include the construction of a new billet cleaning building at a cost of \$375,000 and a new soaking pit at a cost of \$90,000 at the Canton plant.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	2.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$3.60
Black wire, base per 100 lb.	3.75

Pacific Coast

Southern Pacific Buys 2800 Tons of Track Spikes— Inquiring for 5200 Tons of Plates and Shapes

SAN FRANCISCO, April 20 (*By Air Mail*).—Demand for iron and steel products on the Pacific Coast continues well sustained, except for a slowing up in cast iron pipe. The week's business included the award of more than 2800 tons of track spikes and bolts by the Southern Pacific Co. and the opening of bids by the same company on 5200 tons of plates and shapes for flat cars.

Pig Iron.—Those in close touch with the foundry trade report an improvement in the rate of operations among foundries both in the southern part of the State and in the East Bay section. Activity among the plants in the San Francisco area is not so pronounced. A shipment of foreign iron arrived in port this week. Prices on Indian iron have been advanced about \$1 a ton and this material is now quoted at from \$25 to \$26 a ton duty paid, f.o.b. cars San Francisco.

Prices per gross ton at San Francisco:

*Utah basic	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Bars.—A fair tonnage of reinforcing steel bars was placed this week, including 400 tons for a warehouse in Oakland, 210 tons for a museum in San Francisco and 130 tons for a factory in Seattle, all of which went to the Pacific Coast Steel Co. The Northwest Steel Rolling Mills booked 250 tons for a hotel at Bellingham, Wash. Small projects were more numerous. The largest pending project calls for 1225 tons for the West Garfield Street bridge at Seattle. Out-of-stock material on reinforcing steel bars continues firm at 2.30c., base, on carload lots and 2.60c. on less than carload lots. Merchant bar demand is by no means heavy, but prices are firm at 2.35c., c.i.f. Coast ports.

Plates.—The Western Pipe & Steel Co. was awarded 600 tons for caissons for the Southern Pacific bridge across the Carquinez Straits. The Southern Pacific Equipment Co., San Francisco, has taken bids on 3000 tons of plates for 300 flat cars to be built at its Sacramento shops. Prices appear to be firm at 2.35c., c.i.f.

Shapes.—Demand for structural steel shapes continues well sustained,

and awards this week included 445 tons for a warehouse in Oakland, taken by the Pacific Coast Engineering Co., 400 tons for caissons for the Carquinez Straits bridge for the Southern Pacific Co., booked by the Western Pipe & Steel Co., and 330 tons for a bridge at Tacoma, secured by the Isaacson Iron Works. Bids were opened this week by the Southern Pacific Equipment Co. for 2200 tons for flat cars to be built in its own shops. On May 10, bids will be opened for 1370 tons for the West Garfield Street bridge at Seattle. Plain structural material remains firm at 2.35c., c.i.f. Coast ports.

Cast Iron Pipe.—Movement of cast iron pipe has fallen off. Only one award in excess of 100 tons was reported this week. The Pacific States Cast Iron Pipe Co. took 175 tons for a water company at Menlo Park, Cal. Gilroy, Cal., will open bids on April 22 for 113 tons of 4 to 8-in. Class B. On April 23, Alhambra, Cal., will open bids on 136 tons of 6 and 8-in. Class B. A sewer system at Klamath Falls, Ore., bids to be opened May 6, will require 678 tons of 20-in. Class B. Yuba City, Cal., will open bids on May 6 for 132 tons of 6-in. Class B.

Coke.—About 2500 tons of English beehive and by-product coke arrived on the Coast this week, most of it to be applied against contracts placed some time ago. The next large shipment, about 5000 tons, is due in June. Prices have advanced about \$1 a ton owing to freight rate increases and other causes. English beehive material now ranges from \$16 to \$17 a net ton, delivered incoming dock, while by-product coke is held at from \$12.50 to \$13.50 a ton.

Jones & Laughlin Net Profit \$5,254,179 in Quarter

The Jones & Laughlin Steel Corporation reports total first quarter earnings of \$6,907,587, and net, after all charges except dividends, of \$5,254,179.

One Blast Furnace Out; One on at Youngstown

YOUNGSTOWN, April 23.—Production changes this week in the Mahoning Valley include the blowing out by the Youngstown Sheet & Tube Co. of "A" blast furnace in its Campbell group for repairs and relining. Offsetting this loss, however, is the resumption of a stack at New Castle, Pa., by the Carnegie Steel Co. The Carnegie company has stepped up production to 88 per cent from an average of 80 per cent, maintained for several months. On May 1, the company will start at McDonald a new

strip mill, making the tenth unit in this group of mills. It is a high-speed mill and will roll up to 2800 ft. of strip per minute. At Sharon, Pa., the Sharon Steel Hoop Co. is operating two turns per day its new hot strip mill, recently started. The Youngstown Sheet & Tube Co. and the Republic Iron & Steel Co. are averaging 85 per cent, in production schedules.

President Hoover a Blast Furnace Owner

Herbert Hoover is the first President since George Washington to be a blast furnace owner, according to a statement to the press by Charles J. Esterly, Representative in Congress from Pennsylvania. President Hoover recently acquired the Catocin furnace, near Frederick, Md., 60 miles from Washington. Technically, one of his secretaries bought the property, but it is generally understood that it was purchased for the President. James Johnson & Co. built the Catocin furnace in 1774, and it was in blast as late as 1880. In buying the estate on which the remains of the furnace are located, the President was primarily interested in the fishing rights on the property, and seems to have been unaware of the existence of the historic iron plant.

Truscon Expects Large Trade in Aviation Products

The Truscon Steel Co., Youngstown, expects to do a \$2,000,000 business this year in aviation products, including hangars, steel doors, reinforced concrete floors, metal lath and steel sash. The company is now producing at its Youngstown plant from one to two hangars each week, capable of storing from one to 25 planes each.

Harris Creech a Director of Sheet & Tube

Harris Creech, president Cleveland Trust Co., Cleveland, on Tuesday was elected a director of the Youngstown Sheet & Tube Co., at the annual meeting at Youngstown, filling the vacancy caused by the death of Harry Coulby, Cleveland. Ten other directors were reelected. Officers were reelected by directors following the stockholders' meeting.

President James A. Campbell advised that the company's program this year for improvements and betterments, principally in the Chicago district, involves expenditures at the rate of \$1,500,000 monthly. He expects most of this to be paid from earnings. The company has \$18,000,000 in cash at present. Last year Sheet & Tube expended \$14,000,000, all of which came from earnings without special financing.

He believes that the company will enjoy a satisfactory year in 1929, if business continues as at present and prices are sustained.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, $\frac{3}{8}$ -in. and over	3.15c.
Small angles, under $\frac{3}{8}$ -in.	3.55c.
Small channels and tees, $\frac{3}{8}$ -in. to 2 $\frac{3}{4}$ -in.	3.75c.
Spring steel, $\frac{1}{4}$ -in. and thicker ..	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, $\frac{1}{2}$ -in. and larger ..	5.65c.
Com. wire nails, base per keg	\$3.40
Cement c't'd nails, 100 lb. keg	3.40

Non-Ferrous Metal Markets

Copper Steady at 18c., Tin Prices Still Weak, Lead Slightly Lower, Zinc Is Nominal

NEW YORK, April 23.

Copper.—Large producers are selling almost no metal, but custom smelters report a fair business almost every day. Domestic consumers are doing most of the buying, very little being sold for export. Sales are for all positions from May through July. Practically no August metal has been disposed of. Quotations are unchanged and seem stabilized at 18c., delivered in the Connecticut Valley, for electrolytic copper and 18.30c., c.i.f. European ports. A fair business was done in Lake copper last week, but this week the market is dull, with quotations ranging from 18c. to 18.12½c., delivered.

Tin.—A bad break in the London market yesterday, together with falling prices last week, has brought tin to the lowest levels in some time. The quotation of 44.25c. last Friday was the lowest since July 14, 1924. Yesterday London prices fell to around £200 per ton, with a recovery today of about £4 per ton, so that spot standard today was £202 5s.; future standard, £204 5s., and spot Straits, £203 15s. The Singapore price today was £204. These prices, however, are all about £3 per ton less than a week ago. When the market broke yesterday in London, a prominent group supported it, buying 650 tons, with further purchases today. Sales of Straits tin last week were smaller than recently with a total of 600 tons at the close Friday, April 19. Saturday, however, was active with sales of 250 tons, bringing the calendar week's total to 850 tons, or about half of the previous week's sales. Buying on Saturday was due to a very weak market, caused by conditions in London, sales here being recorded at 43.87½c. and 43.75c. at the close, with buyers over. Yesterday accounts were conflicting, with most sellers reporting the market dull, while one declared it was active. About 100 tons changed hands. Today the market was very dull, with spot Straits tin quoted at 44.75c., New York. In general, consumers are comfortably situated as to immediate supplies, but it is believed they are not covered far ahead because they have been buying only nearby deliveries.

Lead.—A fair business is reported

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Apr. 23	Apr. 22	Apr. 20	Apr. 19	Apr. 18	Apr. 17
Lake copper, New York.....	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*.....	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	44.75	44.62½	.....	44.25	45.12½	45.37½
Zinc, East St. Louis.....	6.60	6.60	6.60	6.60	6.65	6.65
Zinc, New York.....	6.95	6.95	6.95	6.95	7.00	7.00
Lead, St. Louis.....	6.85	6.80	6.80	6.85	6.85	6.85
Lead, New York.....	7.00	7.00	7.00	7.00	7.00	7.00

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

Prices on rolled non-ferrous products have been generally marked down to conform to the lower price on ingot copper.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	23.25c.
Copper, hot rolled.....	26.75c.
Zinc	10.25c.
Lead (full sheets).....	11.00c. to 11.25c.
Seamless Tubes—	
High brass	28.25c.
Copper	29.25c.
Rods—	
High brass	21.25c.
Naval brass	24.00c.
Wire—	
Copper	19.87½c.
High brass	23.75c.
Copper in Rolls.....	26.75c.
Brass Tubing.....	30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—		Base per Lb.
High brass	23.25c.	
Copper, hot rolled.....	27.75c.	
Copper, cold rolled, 14 oz. and heavier	30.00c.	
Zinc	10.00c.	
Lead, wide	11.90c.	
Seamless Tubes—		
Brass	28.25c.	
Copper	29.25c.	
Brass Rods		21.25c.
Brass Tubing.....		31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	21.12½c. to 22.12½c.
Copper, hot rolled, base sizes	27.75c. to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	31.00c. to 32.00c.
Seamless Tubes—	
Brass	26.00c. to 27.00c.
Copper	29.12½c. to 30.12½c.
Braced Brass Tubes	29.12½c. to 30.12½c.
Brass Rods	18.87½c. to 19.87½c.

New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.50c. to 11.00c.
Zinc sheets, open	11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	47.00c. to 48.00c.
Tin, bar	49.00c. to 50.00c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	8.00c. to 8.50c.
Lead, American pig.....	7.75c. to 8.25c.
Lead, bar	9.75c. to 10.25c.
Antimony, Asiatic	11.50c. to 12.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy,	24.00c. to 25.00c.
Babbitt metal, commercial grade,	30.00c. to 40.00c.
Solder, ½ and ½	30.00c. to 31.00c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig.....	50.00c.
Tin, bar	52.00c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	7.75c. to 8.00c.
Lead, American pig.....	7.75c. to 8.00c.
Lead, bar	10.00c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade.....	19.00c.
Babbitt metal, high grade.....	54.00c.
Solder, ½ and ½	32.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses. Owing to the unsettled condition of the market these prices are nominal.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	14.00c.	16.00c.
Copper, hvy. and wire	13.50c.	15.00c.
Copper, light and bottoms	12.00c.	13.50c.
Brass, heavy	8.50c.	9.50c.
Brass, light.....	7.50c.	8.50c.
Hvy. machine composition	11.50c.	12.75c.
No. 1 yel. brass turnings	10.00c.	11.00c.
No. 1 red brass or compos. turnings.....	11.00c.	12.00c.
Lead, heavy	5.50c.	6.25c.
Lead, tea	4.75c.	6.00c.
Zinc	4.25c.	5.00c.
Sheet aluminum.....	14.00c.	16.00c.
Cast aluminum.....	12.50c.	14.50c.

today with sales largely for May delivery. There are no inquiries for June. The leading seller at St. Louis is quoting 6.85c., but there were occasional lots offered as low as 6.80c. up to today. The leading interest continues to quote 7c., New York, as its contract price.

Zinc.—Prices are entirely nominal and almost no business is reported, owing largely to the heavy buying recently. Most producers are quoting 6.80c., East St. Louis, but there are occasional lots offered at lower prices, quotations for these ranging down to 6.60c. All sellers agree that there is practically no market. One lot was sold yesterday at 6.80c. The price of zinc ore was again \$44 at Joplin, at the close of last week, with sales very small. Shipments were, however, large at over 14,300 tons.

Antimony.—Chinese metal in a quiet market is offered at 9.50c. for spot and 9.37½c. per lb. for futures, New York, duty paid.

Railroad Equipment

Canadian National Buys 2000 Cars From American Shops

OUTSTANDING in the week's railroad equipment business was the purchase by the Canadian National of 2000 automobile cars from United States builders. Details of the week's inquiries and orders follow:

Canadian National has ordered 1000 automobile cars from Pressed Steel Car Co. and 1000 automobile cars from the Pullman Car & Mfg. Corporation.

Fruit Growers Express is in the market for 150 steel underframes.

Bangor & Aroostook will buy two steel underframes for caboose cars.

New York, Chicago & St. Louis (Nickel Plate) is inquiring for eight coaches, five baggage cars and three baggage-express cars.

Chesapeake & Ohio has ordered 577 steel hopper car bodies from Standard Steel Car Co. Its subsidiary, the Hocking Valley, placed three mail-express cars with Pullman Car & Mfg. Corporation.

Denver & Salt Lake has ordered one baggage-mail and one baggage car from American Car & Foundry Co.

Chicago, North Shore & Milwaukee is in the market for 25 suburban coaches.

Grand Trunk will buy 10 switching locomotives and three of a type not named.

Texas Corporation is in the market for one locomotive.

Metal Tariff Revisions Probably Held Down

WASHINGTON, April 23.—Representative Bacharach of New Jersey, chairman of the subcommittee in charge of the metal schedule, told THE IRON AGE that he thought it would be the latter part of the present week at least before the measure is introduced. Like other members of the committee he has not discussed changes that have been made. Nevertheless the report persists that revisions in the metal schedule have

Nickel.—Ingot nickel in wholesale lots is unchanged at 35c. with shot nickel at 36c. per lb. Electrolytic nickel in cathodes is quoted at 35c. per lb.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted unchanged at 23.90c. per lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO.—Sales are heavier as buyers gain more confidence in the price situation. Specifications against old commitments are at an unchanged rate. The old metal market is quiet and prices are easier.

Prices per lb., in carload lots:

Lake copper, 18.75c.; tin, 45.12½c.; lead, 6.95c.; zinc, 6.65c.; in less-than-carload lots: antimony, 10.50c. Or old metals we quote copper wire, crucible shapes and copper clips, 14.50c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3.75c.; pewter, No. 1, 24.50c., tin foil, 26c.; block tin, 36c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

been "held down." At the same time there are conflicting rumors as to action taken on certain items.

Especially lively are reports concerning the action of the committee regarding manganese ore. It is perhaps entirely accurate to say greater efforts have been exerted for or against an increase in duty on this product than any other in the entire metal schedule. The result is there are two directly conflicting reports, one that the duty actually has been increased and the other that it has been left unchanged.

March British Steel Output Highest This Year

LONDON, ENGLAND, April 18, (By Cable).—March pig iron output was 590,500 gross tons and that of steel ingots and castings was 859,900 tons. Both of these exceed any month this year.

March output, compared with that of January and February and with the monthly average for 1928 and some other years, was as follows in gross tons:

	Pig Iron, Tons	Steel Ingots and Castings, Tons
1913—Av. monthly..	855,000	638,600
1920—Av. monthly..	669,500	755,600
1922—Av. monthly..	408,500	490,100
1923—Av. monthly..	620,000	706,800
1924—Av. monthly..	609,900	685,100
1925—Av. monthly..	519,700	616,400
1926—Av. monthly..	203,500	296,700
1927—Av. monthly..	607,800	758,200
1928—Av. monthly..	550,900	710,400
1929—January	563,900	761,600
1929—February	519,600	782,900
1929—March	590,500	859,900

The monthly average output of pig iron for the first quarter of this year has been 558,000 tons, exceeding the monthly average for 1928 of 550,900 tons. Steel output for the first quarter of this year has been 799,800 tons per month as compared with 710,400 tons per month in 1928. It is the largest monthly rate since the war.

Reinforcing Steel

Awards and New Projects Again in Small Volume

WITH reported awards totaling about 3000 tons and new projects approximately 3000 tons, demand for reinforcing steel remains at moderate levels. The largest award was 400 tons for a tower building at Jackson, Mich. Almost half of the tonnage in new projects is for a bridge at Seattle calling for 1225 tons. Awards follow:

FLUSHING, N. Y., 100 tons, Master Craftsmen's Building, to McClintic-Marshall Co.

PITTSBURGH, 400 tons, Sears, Roebuck & Co. building, to Carlem Engineering Co. CHICAGO, 190 tons, warehouse for Steel Sales, to Duffin Iron Co.

CHICAGO, 125 tons, miscellaneous tonnage for Western railroads, to Vierling Steel Works, local.

CHICAGO, 130 tons, Eckert Hall at University of Chicago, to Calumet Steel Co. OAK PARK, ILL., 100 tons, medical arts building, to Concrete Engineering Co.

MATWOOD, ILL., 275 tons, Veterans' Hospital, to Joseph T. Ryerson & Son.

JACKSON, MISS., 470 tons, Jackson Tower building, to Laclede Steel Co.

BELLINGHAM, WASH., 350 tons, hotel, to Northwest Steel Rolling Mills.

SEATTLE, 131 tons, Consolidated Creamery plant, to Pacific Coast Steel Co.

OAKLAND, CAL., 400 tons, warehouse, Fourth and Jackson Streets, to Pacific Coast Steel Co.

SAN FRANCISCO, 210 tons, museum, Golden Gate Park, to Pacific Coast Steel Co.

PASADENA, CAL., 175 tons, office building, North Oak Street, to unnamed interest.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

EASTON, PA., 350 tons, Easton Hospital. CHICAGO, tonnage not stated, warehouse for Morton Salt Co.

AURORA, ILL., 260 tons, bridge.

St. LOUIS, 450 tons, Plaza Building at Twelfth and Olive Streets.

St. LOUIS, 150 tons, Liquid Carbonic Co. building.

MONTECITO, CAL., 150 tons, Montecito Water District; bids opened.

SAN FRANCISCO, 110 tons, printing plant on Minna Street; bids opened.

MONTEREY, CAL., 119 tons, garage; bids opened.

SEATTLE, 271 tons, West Spokane Street viaduct; bids May 3.

SEATTLE, 1225 tons, West Garfield Street bridge; bids May 10.

Deliveries of Non-Ferrous Ingots in March

CHICAGO, April 22.—The combined deliveries of brass and bronze ingots and billets by all members of the Non-Ferrous Ingot Metal Institute for March amounted to a total of 11,208 tons, according to announcement made by the institute.

Total apparent consumption of bab-bitt metal in March was 6,465,613 lb., compared with 5,720,243 lb. in February, and with 4,927,634 lb. in March, 1928, according to reports received by the Department of Commerce.

Fabricated Structural Steel

Week's Awards Total 34,000 Tons and New Projects Added to Pending List Are 33,000 Tons

A FALLING off in the volume of structural steel work awarded is perhaps of no special significance in view of the large amount of such work still awaiting decision. The week, however, brought total lettings of only 34,000 tons, which was small when compared with some of the recent weekly totals. Work added to the pending list was about 33,000 tons. No contracts of outstanding size were closed, but the inquiries include one for 8500 tons for a Cleveland power plant. Awards follow:

MAINE-NEW BRUNSWICK, 750 tons, International bridge, to Dominion Bridge Co.
BOSTON & MAINE RAILROAD, 150 tons, two bridges, to Boston Bridge Works, Inc.
HARTFORD, CONN., 750 tons, department store, to Levering & Garrigues Co.

NEW YORK, 3200 tons, building on Fifty-eighth Street for Schroeder & Koppel, to McClintic-Marshall Co.

NEW YORK, 3000 tons, office building at Lexington Avenue and Forty-first Street, to Hay Foundry & Iron Works.

LONG ISLAND CITY, N. Y., 200 tons for airplane hangar, to Virginia Bridge & Iron Co.

POUGHKEEPSIE, N. Y., 400 tons, foundry for De Laval Separator Co., to Frank M. Weber.

PAULSBORO, N. J., 1000 tons, tanks for Standard Oil Co. of New Jersey, to unnamed fabricator.

PHILADELPHIA, 400 tons, building for Federal Container Co., to Belmont Iron Works.

PENNSYLVANIA RAILROAD, 1000 tons for bridges in Ohio, 500 tons to American Bridge Co., and 500 tons to Fort Pitt Bridge Co.

ERIE RAILROAD, 100 tons, two bridges at Harrison, N. Y., to Phoenix Bridge Co.
CHESAPEAKE, & OHIO RAILROAD, 600 tons, bridge, to Virginia Bridge & Iron Co.

ATLANTA, GA., 3000 tons for Southern Bell Telephone Co., to Virginia Bridge & Iron Co.

KNOXVILLE, TENN., 1300 tons, State highway bridge, to Virginia Bridge & Iron Co.

RUSSELLVILLE, ALA., 150 tons, addition to Rockwood Alabama Stone Co. plant, to Ingalls Iron Works.

YOUNGSTOWN, 1900 tons, South Avenue bridge, to American Bridge Co.

TOLEDO, 600 tons, plant for City Auto Stamping Co., to Whitehead & Kales Co.

CLEVELAND, 200 tons, warehouse for Nickel Plate Railroad, to Massillon Bridge & Structural Co.

CLEVELAND, 240 tons, exhibition building for Cleveland Union Stock Yards Co., to Pittsburgh Bridge & Iron Co.

DETROIT, 1700 tons, Ford Museum, to Whitehead & Kales Co.

DETROIT, 500 tons, office building for Wabash Railway, to Whitehead & Kales Co.

JACKSON, MICH., 350 tons, factory for Sparks Withington Co., to Whitehead & Kales Co.

CHICAGO, ROCK ISLAND & PACIFIC, 550 tons, bridge reinforcement, to Fort Pitt Bridge Works.

CHICAGO, 750 tons, addition to power plant of Inland Steel Co., to Wisconsin Bridge Co.

CHICAGO, 200 tons, furnace buckstays for Inland Steel Co., to Vanderkloot Steel Works, local.

CHICAGO, 750 tons, apartment building to New City Iron Works, local.

ST. LOUIS, 4700 tons, Plaza Building at Twelfth and Olive Streets, to Mississippi Valley Structural Steel Co.

SEATTLE, 165 tons, Merchants Exchange Building, to Isaacson Iron Works.

TACOMA, WASH., 330 tons, Puyallup River bridge, to Isaacson Iron Works.

OAKLAND, CAL., 444 tons, warehouse for Port Commission, to Pacific Coast Engineering Co.

SAN FRANCISCO, 260 tons, bridge work for Southern Pacific Co., to Virginia Bridge & Iron Co.

SAN FRANCISCO, 1000 tons plates, caissons for Southern Pacific bridge at Carquinez Straits, to Western Pipe & Steel Co.

SAN FRANCISCO, 150 tons, apartment building, Gough and Austin Streets, to Golden Gate Iron Works.

SAN FRANCISCO, 182 tons, apartment building, Pacific and Laguna Streets, to Golden Gate Iron Works.

LOS ANGELES, 125 tons, factory for Emsco Airplane Co., to Consolidated Steel Corporation.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

MONTREAL, 350 tons, building for Good-year Tire & Rubber Co.

NEW YORK, 1000 tons, building on East Forty-fifth Street for Title Guarantee & Trust Co.

NEW YORK, 1000 tons, warehouse at West End Avenue and Sixty-fifth Street.

Farm Machinery Companies Plan Consolidation

Plans are under way for a merger of the Minneapolis Steel & Machinery Co., Minneapolis, manufacturer of tractors, threshers, etc.; the Minneapolis Threshing Machine Co., manufacturer of threshers and combines, and the Moline Implement Co., Moline, Ill., manufacturer of agricultural implements. A new company will be formed to take over and operate three units, headed by W. C. McFarlane, president of first noted company. An expansion plan will be carried out for increased production.

Secretary Lamont to Meet Industrial Advertisers

Secretary of Commerce Lamont is about to send invitations to some 200 executives in industry concerned with selling and advertising to meet in Washington late in May or early in June with officials of the Bureau of Foreign and Domestic Commerce. The purpose of the meeting is to discuss broadly the problems affecting industrial selling and advertising as contrasted with consumer marketing and to review the world's industrial development and its bearing on the sales of both raw and manufactured materials and capital equipment to in-

NEW YORK, 6600 tons, Hotel Pierre, Fifth Avenue; general contract reported to George A. Fuller Co.

WHITE PLAINS, N. Y., 500 tons, office building.

BALTIMORE, 1000 tons, power plant for Pennsylvania Water & Power Co.

READING, PA., 4000 tons, catenary bridges for Reading Railroad electrification from Philadelphia to Lansdale, Pa.

PHILADELPHIA, 5700 tons, catenary bridges for Pennsylvania Railroad electrification, Philadelphia to Trenton. Average low bid by Bethlehem Steel Co. Lehigh Structural Steel Co. low on one and American Car & Foundry Co. low on two of seven items of contract.

EASTON, PA., 250 tons, Hall of Civic Rights for Lafayette College.

ASHTABULA, OHIO, 8500 tons, power plant for Cleveland Electric Illuminating Co.

CLEVELAND, 200 tons, locomotive shops for Cleveland Union Terminals Co.

CLEVELAND, 100 tons, Superior Avenue station for New York Central and Nickel Plate Railroads.

DETROIT, 210 tons, building for Fisher Body Corporation.

DETROIT, 500 tons, Detroit Wax Paper Co.

DETROIT, 500 tons, Detroit Street Railway garage.

JACKSON, MICH., 350 tons, bank.

EVANSVILLE, IND., 700 tons, building for Bell Telephone Co.

SIoux CITY, IOWA, 3000 tons, highway bridge.

MILWAUKEE, 500 tons, building for A. O. Smith Corporation.

MADISON, WIS., 700 tons, office building.

WABASH RAILWAY CO., 1500 tons, bridge at Danville, Ill.

YAKIMA, WASH., 250 tons, telephone building; bids opened.

SEATTLE, 1370 tons, West Garfield Street bridge; bids May 10.

LOS ANGELES, 150 tons, candy factory, Avalon Street; bids opened.

dustry at home and abroad. It is expected that Dr. Julius Klein, who recently returned from Europe, will speak at the dinner following the meeting, in company with one of the leaders in the industrial field.

"Meetings of this character under the Department's auspices in the past few years," said Secretary Lamont, "have brought about not only confidence and a spirit of cooperation on the part of industry, but also a very appreciable improvement in the functioning of the Department itself. I am particularly happy to follow this precedent created by President Hoover when Secretary of Commerce, who so ably demonstrated the value to business of a governmental bureau organized for public service."

Foundry Equipment Orders Show Gain

The March index of gross orders booked by members of the Foundry Equipment Manufacturers Association rose to 209.4 from 197 in February. The March index in 1928 was 138.6. The index of unfilled orders also gained, standing at 414.4 on March 31, compared with 321.2 one month previous. March shipments, at 197.5, showed a decline from the February index of 214.8.

PERSONAL

C. FRANK BLACKMER, who, as announced in *THE IRON AGE* last week, has been appointed general superintendent in charge of operations of the American Steel & Wire Co., has been general superintendent of the wire mills of that company since December, 1927, at which time his headquarters were removed to Cleveland. He succeeds as the operating head H. A. BARREN, who has retired

appointed general manager of sales at Chicago, has been, since October, 1924, manager of the fence and post sales department at Chicago. He became affiliated with the wire industry in 1895 with the Consolidated Barbed Wire Co. at Joliet, Ill., a predecessor of the American Steel & Wire Co. After several years in the operating and accounting departments at the mills, he was transferred to the



C. F. BLACKMER



J. C. HOPKINS



H. A. SQUIBBS

and who has been vice-president in charge of operations. Mr. Blackmer has been connected with the wire-making industry since July, 1898, when he became an assistant in the laboratory of the Waukegan, Ill., works of the company. He advanced by successive stages and in March, 1912, was appointed assistant superintendent of the Waukegan works. In June, 1921, he was made superintendent of the wire mills of the Minnesota Steel Co. at Duluth and in March, 1925, was promoted to manager of the Pittsburgh district of the company. He served in that capacity until he was placed in charge of all the wire mills.

JOHN C. HOPKINS, who has been appointed general superintendent of blast furnaces and steel works of the company, has been superintendent of the Central furnaces in Cleveland since Dec. 15, 1922. He began his blast furnace training with the Penn. Iron & Coal Co., formerly operating the Dover furnace at Dover, Ohio, and later was with the Buffalo Union Furnace Co., the Republic Iron & Steel Co. and the Massillon Iron & Steel Co. In 1911 he entered the employ of the American Steel & Wire Co., as stove tender at the Central furnaces. He has served in various capacities at the blast furnace plants of the company at Donora, Pa., Shoenberger, Pittsburgh, and Emma Furnace in Cleveland as well as the Central furnaces.

HENRY A. SQUIBBS, who has been

sales division, where he was promoted from correspondent to assistant manager and later to manager of his department.

ROLLIN K. CHENEY, lately with the Halcomb Steel Co., Syracuse, N. Y., a subsidiary of the Crucible Steel Co. of America, is now general superintendent of the Danville Structural Steel Co., Danville, Pa. This plant is engaged in rolling tubing, angles, concrete bars, etc., from rails. Mr. Cheney's previous steel mill experience, after his graduation from Cornell University in 1903, has included several years in the South Side plant of the Jones & Laughlin Steel Co., Pittsburgh, 12 years as general superintendent of the Sweets Steel Co., Williamsport, Pa., and shorter periods with the Southern California Steel Co. and the Knoxville Iron Co., Knoxville, Tenn.

H. R. GEER, consulting engineer at the Cambria plant, Johnstown, Pa., of the Bethlehem Steel Corporation, is acting temporarily as plant engineer at the Danville Structural Steel Co., Danville, Pa., where developments are under way intended to reduce materially the labor cost involved in rerolling steel rails into other products.

W. H. DAVEY, president and general manager of the Empire Steel Corporation, Mansfield, Ohio, sailed April 19 for several weeks' trip to Europe.

H. G. DALTON, Pickands, Mather & Co., Cleveland, and B. A. TOMKINS, president Bankers Co., subsidiary of the Bankers Trust Co., Cleveland, have been elected directors of the Central Alloy Steel Corporation, Massillon. Mr. Dalton fills the vacancy caused by the death of Harry Coulby and Mr. Tomkins takes the place of Bayard Dominick.

E. JANITSKY, metallurgical engineer at South works, Illinois Steel Co., has left on an extended tour of Scotland, England, France, Belgium and Austria.

JULIUS KLEIN has been appointed Assistant Secretary of Commerce by President Hoover. He had served since 1921 as director of the Bureau of Foreign and Domestic Commerce, being called to that position when Mr. Hoover became head of the Department of Commerce.

JAMES N. HEALD, general manager, and S. T. MASSEY, assistant general manager, Heald Machine Co., Worcester, Mass., will sail for Europe on April 26 to remain about six weeks.

E. J. HERGENROTHER, until recently assistant metallurgist, Cadillac Motor Car Co., has become associated with the development and research department of the International Nickel Co., in the Detroit office.

CHARLES P. ROGERS has been elected president of Beals, McCarthy & Rogers, Inc., Buffalo, N. Y., to succeed the late Eugene J. McCarthy.



C. P. ROGERS

Mr. Rogers has been connected with the company since 1880.

G. LARUE MASTERS has been made sales manager of the National Lock Washer Co., Newark, N. J.

E. R. HANSEN, formerly with the McCord Radiator & Mfg. Co., has been appointed chief engineer of the Acklin Stamping Co., Toledo, Ohio.

WILLIAM K. WAYLAND, who was general superintendent of the Wagner

Malleable Iron Co., Decatur, Ill., recently became plant superintendent of the Illinois Malleable Iron Co., Chicago.

W. A. ROWE, production manager, and ROBERT D. BLACK, advertising manager, Black & Decker Mfg. Co., Towson, Md., have returned from Europe, where they spent several months at the factory of Black & Decker, Ltd, Slough, Bucks, England. CHARLES STROM recently joined the export sales department.

W. C. DICKERMAN, vice-president, American Car & Foundry Co., has been elected president of the American Locomotive Co., succeeding WILLIAM H. WOODIN. Mr. Woodin retains his position as chairman of the board.

B. F. PHILLIPSON, president, Climax Molybdenum Co., New York, sailed Saturday, April 20, for Europe on the Majestic. He will spend six to eight weeks there on business.

GEORGE A. BLACKMORE, recently first vice-president and general manager of the Union Switch & Signal Co., Swissvale, Pa., was elected president and general manager of the company at a recent board meeting. He takes the place of A. L. HUMPHREY, who has been elected chairman of the board. Mr. Blackmore entered the employ of the company in 1896, and in 1901 was made chief clerk in the engineering and estimating department. In 1904 he was transferred to the New York office, and in 1909 be-



G. A. BLACKMORE

came assistant Eastern manager, with headquarters in New York. Two years later he was appointed Eastern manager in charge of the New York, Montreal and Atlanta, Ga., offices. Mr. Blackmore was made general sales manager of the company in 1915 and became a vice-president two years later. He had been vice-president and general manager since 1922.

E. M. HUMMER, vice-president and general manager, Defiance Machine Works, Defiance, Ohio, will sail from New York May 8 for a two months' trip on the Continent. He will spend several weeks in Russia, supervising the installation and operation of Defiance machines sold recently to the Soviet Government through the Amtorg Trading Corporation, New York, for use in a farm wagon plant.

WILLIAM G. CLYDE, president, Carnegie Steel Co., Pittsburgh, has returned from a two months' trip to Panama, California, and the Hawaiian Islands.

JOHN E. EDGERTON, president, National Association of Manufacturers, will be the principal speaker at a manufacturers' dinner to be given by the Toledo, Ohio, Chamber of Commerce, May 9. C. O. MINIGER, president, Electric Auto-Lite Co., will also speak.

HORACE B. SPACKMAN has been appointed chairman of the executive committee of the Lukens Steel Co., it is announced by ROBERT W. WOLCOTT,



H. B. SPACKMAN

president of the company. Mr. Spackman relinquishes his duties as vice-president and purchasing agent, and is succeeded in the latter position by HUGH KENWORTHY, who has been assistant purchasing agent. Mr. Spackman has been with the Lukens Steel Co. for 48 years, having started as an office boy. He became purchasing agent in 1892, and in 1897 was elected a director of the company.

S. L. HOYT, research laboratory of the General Electric Co., addressed the Cleveland Engineering Society, April 23, on "This New Metal—Carbonyl."

JOHN R. BRIGGS, Henry Potts & Co., was reelected president of the Philadelphia chapter of the Institute of

Scrap Iron and Steel, Inc., March 13. Other officers elected were Harry A. Kirshman, Allegheny Iron & Metal Co., vice-president; J. B. Partridge, Jr., Chester Iron Co., secretary; R. M. Marshall, Marshall Iron & Metal Co., treasurer. J. V. S. Bishop, Allen R. Hoffer and H. A. MacMullen were elected to the executive committee.

Obituary

JULIAN BURDICK, president and one of the founders of the West Penn Steel Co., Brackenridge, Pa., died suddenly on April 21 at his home in Pittsburgh, aged 51 years. He had spent his entire business career in the steel



J. BURDICK

industry at Pittsburgh, and before the founding of the West Penn company in 1909 he was associated with the Interstate Steel Co. at Brackenridge. He was also vice-president and a director of the Thomas Spacing Machine Co., and recently had been active in the formation of Airways & Aircraft, Inc., Pittsburgh. He was also a director in the Pennsylvania Trust Co. and had been active in other Pittsburgh financial and civic enterprises.

NEWTON A. HEMPHILL, at one time president of the Mackintosh-Hemphill Co. as well as an organizer and director of the Carbon Steel Co., both of Pittsburgh, died at his home in that city on April 17. He was 76 years of age and had retired from the steel business in 1903. In more recent years he had been active in the oil industry.

Erie Railroad has specified the use of Toncan iron, a rust-resisting product of the Central Alloy Steel Corporation, Massillon, Ohio, for floors and sides of 250 gondola cars, which it recently purchased. This is the second railroad that has recently specified this metal which permits a reduction in weight of a car without reducing carrying capacity.

Technical Papers for British Institute's May Meeting

For the Diamond Jubilee meeting of the Iron and Steel Institute to be held in London, May 2 and 3, the following technical papers are to be presented:

Third report on heterogeneity of steel ingots by a committee of the institute; first report on blast furnace plant and practice by a committee of the institute; "Brittleness in Mild Steel," by G. R. Bolsover; "The Erosion of Guns," by R. H. Greaves, H. H. Abram and S. H. Rees; "The Mechanical and Metallurgical Properties of Spring Steels as Revealed by Laboratory Tests," by G. A. Hankins and Miss G. W. Ford; "The Differential Method for Measuring the Thickness of Hard Cases Without Sectioning Them," by E. J. Herbert and P. Whitaker; "The Transformation of Austenite into Martensite in a 0.80 Per Cent Carbon Steel," by Dartrey Lewis; "Twenty Months' Results of Dry Blast Operation," by E. H. Lewis; "Constitutional Diagrams for Cast Iron and Quenched Steels," by A. L. Norbury; "A New Method for the Production of Sound Steel," by Sir Charles Parsons and H. M. Duncan; "The Oxidation of Iron and Steel at High Temperatures," by L. B. Pfeil; "The Microstructure of Rapidly Cooled Steel," by J. M. Robertson; "A Method for the Estimation of Hydrogen in Steel," by T. E. Rooney and G. Barr; "The A. I. B. Sinter Plant at Guest, Keen & Nettlefolds, Ltd., Cardiff Works," by W. E. Simons; and "The Influence of Pickling Operations on the Properties of Steel," by H. Sutton.

An additional meeting has been arranged for May 9 in the society's room at the Royal Technical College, Glasgow. This will be under the auspices of the West of Scotland Iron and Steel Institute and will be for the object of further discussion of five papers presented at the annual meeting the week before. John Craig, vice-president, will be chairman.

For the same purpose another additional meeting will be held in the Mappin Hall at the University of Sheffield on the afternoon of May 15 with Prof. C. H. Desch as chairman.

The autumn meeting is to be held at Newcastle-on-Tyne under the presidency of Prof. Henry Louis, Sept. 10 to 13.

Manganese Ore Corporation Formed in South Africa

An agreement has been concluded between the owners of a group of manganese deposits at Postmasburg, 65 miles northwest of Kimberley, South Africa, and the British-Swiss International Corporation of London, according to Trade Commissioner Samuel H. Day, Johannesburg. A new company, known as the Manganese Corporation of South Africa, Ltd., is being formed to work the deposits. It contemplates in addition the establishment of an electrical smelting works at Colenso to produce ferromanganese. An agreement has been reached with the South African Railways Administration whereby the latter will con-

struct the 65 miles of branch railroad to the manganese deposits at a cost of £300,000 to be supplied by the British-Swiss corporation. This amount is to be refunded at the end of 10 yr. when the railroad will be owned and operated by the South African Railways.

The guaranteed output of manganese ore is 200,000 tons the first year and 350,000 annually thereafter. It has been reliably reported that a contract has already been made for the disposal of 100,000 tons a year in the United States.

A.S.M.E. Meeting to Include Visit to National Parks

The spring meeting of the American Society of Mechanical Engineers, to be held at Salt Lake City, July 1 to 4, will include visits to copper mines in Butte and Great Falls, Mont. One group of engineers will leave New York June 17, stop over in Chicago for a sightseeing tour and then proceed to the Rocky Mountain National Park, Colorado. Five days will be spent in visiting the Grand Canyon, Zion National Park and Bryce Canyon. The next stop will be at West Yellowstone, Butte and Great Falls. A visit will also be made to the Glacier National Park.

Steel Doors for Dirigible Plant Weigh 750 Tons

The contract for the manufacture of the door-operating mechanism for the unique doors of the largest airship factory and dock in the world, now being built at Akron, Ohio, by the Goodyear Zeppelin Corporation, has been awarded to the Wellman-Seaver-Morgan Co., Cleveland. The contract includes the supporting trucks and hinges and the electrical equipment for operating the doors. Each end of the building, which will be approximately 1200 ft. long, 325 ft. wide and 200 ft. high, will have two doors of curved structural surfaces entirely unlike any hangar doors ever built in this country. These doors in form will be substantially like a quarter section of an orange peel.

Each of the four electrically-operated doors will be supported on 10 four-wheel trucks, the trucks being built in radial form to run on a curved track having a radius of approximately 188 ft., so that when the doors are in full open position, they will stand in a plane paralleling and close to the side of the building, a position which will practically avoid the heavy wind pressure to which doors of the ordinary design would be subjected. The trucks and wheels will be similar to those used on ore handling equipment. The 40 wheels to each door leaf will be of rolled steel 27 in. in diameter. Each door will have a center hinge pin at the top with a ball and socket joint. The size of the doors is indicated by the weight, approximately 750 tons each.

From the closed position to the open position alongside the building the trucks will travel approximately a quarter of a circle, the speed of travel being about 40 ft. a minute, so that five minutes will be required to open the doors or to close them. The doors will be independently operated and the control mechanism will be located in an operator's house outside of each door. The control of the speeds at both ends of the travel of the doors is of importance and provision will be made against too sudden stopping at any position and also for a very slow creeping speed as the ends of the travel are approached.

The plans and specifications for the doors were prepared for the Goodyear Zeppelin Corporation by its engineers, Wilbur Watson & Associates, Cleveland, with F. E. Hulett, Cleveland, as consulting mechanical engineer. The doors are being fabricated by the American Bridge Co.

Fabricated Structural Steel Makes New Record

WASHINGTON, April 23.—Orders for fabricated structural steel in March, as reported to the Department of Commerce by the principal manufacturers, were 93 per cent of capacity, based on total orders of 292,426 tons reported by fabricators with a capacity of 314,195 tons a month, as against February orders of 70 per cent of capacity and 67 per cent a year ago. Shipments of fabricated structural steel in March represented 72 per cent of the capacity of firms reporting this item, as against 62 per cent in February and 59 per cent a year ago. Orders in March were the largest ever recorded.

The table lists the statistics reported by 237 identical firms (including data in earlier months for 33 additional firms now out of business) with a present capacity of 320,710 tons a month, compared with 322,660 tons in 1928, 314,770 tons in 1927, 298,265 tons in 1926, 292,965 tons in 1925, 276,060 tons in 1924, 267,150 tons in 1923 and 260,070 tons in 1922. For comparative purposes, the percentage figures are used to obtain a computed total for the United States, based on a capacity of 360,000 tons in 1926, 375,000 tons in 1927 and 385,000 tons in 1928 and 1929.

	New Orders, Computed Tonnage	Shipments, Computed Tonnage
1928		
January	207,900	204,050
February	265,650	231,000
March	257,950	227,150
3 months.....	731,500	662,200
April	234,850	238,700
May	308,000	261,800
June	296,450	261,800
July	296,450	265,650
August	354,200	288,750
September	319,550	273,350
October	250,250	319,550
November	242,550	273,350
December	246,400	281,050
Year	3,280,200	3,126,200
1929		
January	273,350	281,050
February	269,500	238,700
March	358,050	277,200
3 months.....	900,900	796,950

Prices Stronger in British Markets

Fuel Scarcity Relaxing—German Coal Strike Impending; Steel Exports Greater—Tin Plate Order Books Full

(By Cable)

LONDON, ENGLAND, April 22.

EXPORT demand for fuel has decreased and there is a consequent easing in price, enabling pig iron producers to increase their output. Dorman, Long & Co. have blown in one Newport furnace. Palmers Shipbuilding & Iron Co. expects to resume operation in May of two furnaces at Jarrow-on-Tyne and will also reopen its ore mine, which has long been closed. Bolckow, Vaughn & Co. will resume operation of their ore mines.

Cleveland makers are sold out until June and supplies for prompt shipment are unobtainable. Hematite iron is firm with demand well sustained and arrangements being made for increasing production.

Steel prices are strong, British mills leaving the controlled prices unchanged although costs have advanced fully 15s. (\$3.63) per ton since February of last year. The capacity of plate mills, however, is large and more tonnage is needed. Producers of semi-finished steel are busy and prices are advancing. Consequently more attention has been paid recently to foreign material.

Welsh tin plate makers are booking some good export orders and mills are fully sold for some months. The decline in the tin price has reduced costs

by about 2d. to 3d. (4c. to 6c.) per base box, but this is offset by more expensive pig iron and steel scrap.

Galvanized sheets are quiet, but makers have agreed to a minimum price for No. 24 gage sheets, corrugated, in bundles, of £13 7s. 6 d. per ton (2.90c. per lb.), f.o.b. Black sheets are quiet with Far Eastern demand inactive.

Beyer, Peacock & Co., Ltd., Manchester, has a contract to build 16 locomotives of 232 tons each to cost about £230,000 for the Bengal-Nagpur Railway. These are the largest type locomotives yet constructed in Europe. Lord Hailsha, the Lord Chancellor, addressing a meeting of the National Federation of Iron and Steel Manufacturers, said that Premier Baldwin had promised that if the Conservative Party wins the General Election it will institute an inquiry as to the possibility of safeguarding the iron and steel industry. Also, if Premier Baldwin is returned, the Government will cooperate with the manufacturers in research calculated to increase production and will defray a substantial portion of the cost.

Continental 2-in. billets have been bought at £5 9s. (\$26.43) per ton, f.o.b. Antwerp, and sheet bars at £5 8s. 6d. (\$26.31) per ton, f.o.b. Antwerp. Since the purchases were made,

demand has apparently been satisfied.

The Western European Pig Iron Entente has advanced foundry iron prices to £3 7s. 6d. (\$16.37) per ton for the United Kingdom and to £3 12s. (\$17.45) per ton, Antwerp, to other export markets.

At the recent meeting of the International Rail Makers Association, the questions of renewal and rail prices were not discussed. Control of the British excess production of rails is based on a penalty of 10s. (\$2.42) per ton for the first 37,500 tons in excess of the quota and 20s. (\$4.85) per ton for all other over production. The next meeting will be at the end of June.

The International Tube Cartel renewal, ratified in London, includes Continental makers, the United Kingdom, United States and Canada, with a special arrangement for membership of Stewarts & Lloyds in South Africa. The agreement covers gas, water and oil tubes. An agreement on locomotive and boiler tubes has not yet been reached. The agreement began on Dec. 17, 1928, and is in force until March 30, 1935, with an option that Germany may denounce it in 1930 or 1932.

German production in March was 1,061,000 tons of pig iron with 97 furnaces active on April 1.

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works with American equivalent figured at \$4.85 per £ as follows:

				Continental Prices F.o.b. Antwerp or Hamburg			
Durham coke, del'd....	£0 19s.		\$4.60	Foundry iron, 2.50 to			
Bilbao Rublo ore.....	1 3		6.18	3.00 per cent sil., 0.50			
Cleveland No. 1 foundry	3 11		17.21	to 0.90 per cent phos.	£3 7½s. to £3 12s.	\$16.37 to \$17.45	
Cleveland No. 3 foundry	3 8½		16.61	Foundry iron, 2.50 to			
Cleveland No. 4 foundry	3 7½		16.37	3.00 per cent sil., 1.00			
Cleveland No. 4 forge..	3 7		16.25	per cent and more			
Cleveland basic (nom.)	3 7½		16.37	phos.	3 9	16.73	
East Coast mixed.....	3 14		17.94	Billets, Thomas.....	5 8 to 5 9	26.19 to 26.43	
East Coast hematite...	3 14½		18.06	Sheet bars, Thomas...	5 10 to 5 11	26.68 to 26.91	
Rails, 60 lb. and up...	7 15	to £8 15s.	37.59 to \$42.43	Wire rods, Low C., No.			
Billets	6 7½		30.91	5 B.W.G.	6 5 to 6 6¼	30.31 to 30.61	
Ferromanganese	13 15		66.69	Black sheets, No. 31			
Ferromanganese				gage, Japanese.....	12 12½	61.16	
(export)	13 10	to 14 0	65.47 to 67.90	Rails, 60 lb. and heavier	6 10*	31.52	
Sheet and tin plate				Rails, light.....	6 0	29.10	
bars, Welsh	6 6¼		30.61	Steel bars, Thomas...	6 2 to 6 3	1.33 to 1.34	
Tin plate, base box....	0 18½	to 0 18¾	4.45 to 4.53	Beams, Thomas, British			
Black sheets, Japanese				standard	5 4	1.12	
specifications	13 10		65.47	Channels, Thomas,			
				American sections...	6 5	1.35	
Ship plates	7 12½	to 8 2½	1.66 to 1.76	Angles, Thomas, 4-in.			
Boiler plates	9 0	to 10 10	1.95 to 2.27	and larger, over ¾-in.			
Tees	8 2½	to 8 12½	1.76 to 1.86	thick	5 10	1.15	
Channels	7 7½	to 7 17½	1.60 to 1.71	Angles, Thomas, 3-in...	5 14	1.23	
Beams	7 2½	to 7 12½	1.55 to 1.65	Ship plates, open-hearth,			
Round bars, ¾ to 3 in.	7 15	to 8 5	1.67 to 1.78	inspected	7 10	1.62	
Steel hoops	9 0	to 10 0	1.95 to 2.16	Hoop and strip steel,			
Black sheets, 24 gage..	10 0		2.16	over 6-in., base.....	6 7½	1.38	
Galv. sheets, 24 gage..	13 7½	to 13 10	2.90 to 2.92	Wire, plain, No. 8 gage	7 12½	1.65	
Cold rolled steel strip,				Wire, galvanized, No. 8			
20 gage (nom.).....	12 0		2.64	gage	9 15	2.11	
				Wire, barbed, 4-pt., No.			
				12 B.W.G.	12 5	2.65	
				Wire nails, base.....	8 5	\$1.79 per keg	
				Wire nails, assortments,			
				1 to 6-in., keg.....	10 15	2.32	

*Ex-ship, Tees, nominal.

*Open-hearth steel, 7½s. (\$1.82) per ton extra.

British Pig Iron Advancing

Fuel Scarcity an Obstacle to Greater Output—Plate Mills Need Orders—Britain May Join Steel Cartel

LONDON, ENGLAND, April 12.—Since the resumption of trading after the Easter holidays, business in iron and steel has steadily expanded. At present, pig iron is the most active product, with demand coming from both domestic and foreign sources. Cleveland producers are in a strong position, being practically sold out for the first half of the year and having negligible stocks. As producers do not plan to light any more stacks, quotations are firm; in fact, for sales beyond June, Cleveland No. 3 G. M. B. is selling at a premium of 1s. 6d. (36c.) per ton. The chief obstacle to increasing output is the high cost and scarcity of fuel supplies, and indications point to a steady advance in raw material prices throughout the year.

The situation in hematite iron is almost identical with that in foundry grade, except that there is no control of prices, so that quotations continue to advance steadily. Supplies of basic iron are small and, while some tonnage is still coming from the Continent, demand cannot be met.

With pig iron and other raw materials very firm similar conditions

prevail in the steel market. Prices of steel are advancing but makers are not reaping the full benefit. In some cases, particularly in tin plate, active conditions have failed to hasten consumers into commitments. Demand from shipyards has declined somewhat, and export buying has been affected by the recent holiday interruptions. Most of the recent business in heavy steel has been in structural material, so that the condition of plate mills has not been relieved to any extent. Capacity of the plate mills is large, and a heavy and continuous demand is necessary to maintain satisfactory operations.

It is reported that negotiations have been reopened for the inclusion of British steel works in the International Steel Cartel, and that British makers are in favor of joining, provided the cartel is renewed for five years at the conference to be held in June. It is difficult, however, to obtain reliable information. In view of the fact that the position of the cartel itself is not sound, it is considered doubtful that a definite agreement will be reached.

the Vereinigte Stahlwerke A. G., Düsseldorf, on March 31, was 10 per cent higher than the average monthly total in the fiscal year 1927-1928. In the first quarter of this year the Vereinigte Stahlwerke A. G. produced 1,820,000 metric tons of steel ingots, compared with 1,020,000 tons in the last quarter of 1928. Pig iron production was 1,660,000 tons, compared with only 950,000 tons in the final quarter of last year. The sharp increases are accounted for by the curtailment of operations during the November lockout. The number of employees totaled 171,900 on March 31, compared with 167,400 on Dec. 31, 1928. Total sales of the corporation in the first quarter were 358,640,000 m. (\$83,649,040), of which 223,550,000 m. (\$52,757,800) represented business from German consumers. This compares with sales in the previous quarter totaling 275,010,000 m. (\$64,902,360), of which 180,697,000 m. (\$42,644,492) represented domestic bookings. The report is considered unexpectedly favorable.

Belgium Buys German Coke Ovens

Belgian coke producers are reported to have placed large contracts for coke ovens with the German Koppers A. G., Essen. The Belgian iron and steel industry is using an increasing tonnage of coke, and the obsolescent ovens now in use among smaller producers in Belgium are unable to meet this demand, either in volume or quality.

The Oskar Kohorn Co., Chemnitz, Saxony, which builds rayon machinery at Halle and at Woellersdorf near Vienna, has concluded a contract with the Russian Government for the construction of two rayon mills at Klin and Moghileff, Russia.

Ruhr Coal Mines Threatened with Strike

Present Wage Agreement Unsatisfactory to Union—Steel Exports Increasing—Russia Buys Rayon Machinery

BERLIN, GERMANY, April 10.—A strike in the Ruhr coal mines is feared since the miners' union states that the existing wage agreement is unsatisfactory and will be terminated May 1. Claims that there have been increases in the profits per ton of coal mined are denied by the operators. An immediate strike is not in prospect, as arbitration must be tried before such action can legally be taken.

Miners' wages were last increased in May, 1928, and have been advanced nine times since 1924. The present wage per shift for hewers is 9.60 m. (\$2.27) compared with 5.40 m. (\$1.27) in March, 1924. The coal companies contend that a severe burden is imposed on them by the Ruhr coal syndicate's tonnage assessment, or "Umlage," the receipts from which are largely devoted to financing exports and business in the so-called "contested districts" in Germany, where sales are often made at a loss. Despite a slight reduction in this assessment recently, its general trend has been upward. In 1928 the Harpener Corporation, one of the leading coal companies, passed its dividend, but paid into the assessment almost 13,000,000 m. (\$3,068,000). Most of this amount would have been added to profits if it had not been for the necessity of maintaining the cartel

fund to meet British and Polish competition in export trade and in the contested districts of Germany.

Steel Export Increasing

Foreign orders for iron and steel have been increasing, and there is evidence of better demand in the domestic market for structural material and steel bars. Western European mills have been maintaining a firm attitude on prices of pig iron and semi-finished material, and German export orders for pig iron, semi-finished material, bars, structural steel, heavy-gage sheets and wire rods have been larger than for several weeks. Export demand for wire rods has been so active that the Wire Rod Cartel has refused some new business. The German Tube Syndicate reports a decided decline in business as a result of the recent severe weather. Mills are, as a rule, well booked with orders and early this month were four to five weeks behind on deliveries of semi-finished products, four weeks on rails, three to four weeks on structural shapes, four to six weeks on bars and two to three weeks on heavy shets.

The steel industry in general expects a marked improvement in business in the next few months, and it is noteworthy that unfilled tonnage of

German Wire Rod Makers Fully Engaged

HAMBURG, GERMANY, April 10.—The German Wire Rod Cartel is operating at almost 100 per cent of capacity, equivalent to about 125,000 metric tons a month. The capacity of non-members of the cartel does not aggregate more than 3000 tons a month. Export business is reported to be satisfactory, and cartel members not only are not pressing for further tonnage but are rejecting many small tonnage orders.

At the end of this month the International Wire Rod Cartel will meet in Berlin. Action is looked for on an extension of the cartel agreement and a proposed advance in prices. It is expected that the cartel quotation will be increased 2s. 6d. (61c.) per ton to £6 7s. 6d. (\$30.91) per ton.

Locomotive Cartel Dissolved

HAMBURG, GERMANY, April 10.—The Association of German Locomotive Builders has been dissolved, and it is believed that the result will be a reduction in export quotations on locomotives.

Machinery Markets and News of the Works

Slight Recession in Buying

April Orders May Not Equal Those of March, but Volume of Business Is Still Heavy

ALTHOUGH a good many machine tool companies apparently will not book as much business this month as they did in March, the volume of buying continues at a high rate. Some hesitation has developed among buyers because of deferred deliveries. Shipments on many tools ordered now will not be made until late summer or early autumn, and many buyers are not sure they will need the machines then as badly as they do now. Delivery is the deciding factor in nearly all sales.

Railroad purchases are adding life to the Chicago market, where business had begun to lag behind the rate of the early part of the month. The Santa Fe, St. Paul and Burlington roads are buying against old inquiries.

A list is expected soon from the Union Pacific. Prices have gone in on the large list of the Delaware, Lackawanna & Western, mentioned last week. The Chesapeake & Ohio is inquiring for 16 tools.

Cleveland reports generally good business, in which the demand for presses is outstanding. The Geometric Stamping Co., Cleveland, bought seven. A Detroit copper company bought eight machine tools for a tool room.

In the Eastern district, the largest buying was that of the Eclipse Machine Co., East Orange, N. J., manufacturer of airplane starters, which ordered about 20 tools, mostly turret lathes. This company made a sizable purchase a few weeks ago.

New York

NEW YORK, April 23.—Most of the local sellers of machine tools report a slight falling off in business this month. As nearly as can be estimated, April sales may be about 10 per cent below those of March. There are some exceptions, a few reporting sales fully up to those during the same period last month. The Eclipse Machine Co., East Orange, N. J., which bought heavily a few weeks ago, was again a large buyer last week, taking about 20 or more machines, mostly turret lathes. This company is a part of the newly formed Bendix Aviation Corporation, and specializes in starters for airplanes.

Victor Metal Products Corporation, 196 Diamond Street, Brooklyn, has revised plans for rebuilding three-story plant, recently damaged by fire, to cost about \$45,000. Albert C. Kunz, 781 Manhattan Avenue, is architect.

George G. Miller, 1482 Broadway, New York, architect, has filed plans for a six-story automobile service, repair and garage building, 75 x 100 ft., to cost about \$225,000 with equipment.

Anchor Cap & Closure Corporation, 22 Queens Street, Long Island City, manufacturer of metal bottle caps, capping machinery, etc., with affiliated organization known as Anchor Cap Corporation, is having plans drawn by Stone & Webster

Engineering Co., 120 Broadway, New York, engineer, for six-story plant at Queens Street and Jackson Avenue, to cost more than \$300,000 with equipment. Plant of American Metal Cap Co., 2 Summit Street, Brooklyn, recently acquired, will be removed to new location.

Inspiration Consolidated Copper Corporation, 25 Broadway, New York, has plans for new refinery for treating leached tailings, to cost more than \$200,000 with equipment.

Eagle Bronze Works, North Bleeker Street, Mount Vernon, N. Y., has asked bids on general contract for three-story addition, including improvements in present factory, to cost \$60,000. George M. Bartlett, 103 Park Avenue, New York, is architect.

S. Parisi, 1611 Hendrickson Street, Brooklyn, has plans by Burke & Olsen, 32 Court Street, architects, for two-story ice-manufacturing plant at Corona, L. I., to cost about \$150,000 with equipment.

J. H. Friend, 148 Alexander Avenue, New York, architect, has plans for one-story automobile service, repair and garage building, 120 x 200 ft., to cost about \$100,000 with equipment.

S. Steinmetz, 61 School Street, Yonkers, N. Y., will soon take bids for a three-story cold storage and refrigerating plant, to cost about \$170,000 with machinery. J. Watson, City Hall, is architect.

New York Air Terminals, Inc., New York, care of Richard F. Hoyt, Hayden, Stone & Co., 25 Broad Street, investment

securities, has arranged for purchase of Hadley Field, near New Brunswick, N. J., consisting of 120-acre tract improved for airport service. New owner plans construction of additional hangars, repair shops and other buildings. It is planned to purchase adjoining tract of 64-acres for expansion. Company will carry out a similar project on 743-acre tract on Hackensack Meadows, Secaucus, N. J., to cost about \$3,000,000 with equipment; and will establish seaplane bases, with hangars, shops, etc., at Black Tom, near Communipaw, N. J.; at North Beach, Queens; and on North River, near 100th Street. Entire project will cost over \$4,500,000. W. F. Carey is president.

Texas Co., 17 Battery Place, New York, will build a new oil storage and distributing plant on site lately acquired at Little Ferry, N. J., to cost more than \$80,000 with equipment.

Board of Education, Jersey City, N. J., is said to be planning installation of manual training equipment in two-story addition to Dickinson High School, to cost \$475,000. John T. Rowland, Jr., 30 Journal Square, is architect.

Peter J. Schweitzer, Inc., 170 Cornhill Avenue, Jersey City, N. J., manufacturer of paper products, has purchased former plant of Stanwood Rubber Co., Newark, including adjoining 7-acre tract, and will remodel for new plant, to cost over \$100,000 with machinery.

Seacoast Iron Works, Inc., Red Bank, N. J., recently organized with capital of \$127,000 by Henry O'Haver, Atlantic Highlands, N. J., and associates, has acquired property at Red Bank, and will remodel for new plant for structural steel fabricating, assembling and other work. Mr. O'Haver will be president; and George W. Howland, Little Silver, N. J., vice-president.

Jersey City Airport, Inc., Jersey City, N. J., Fred Lewis, head, has leased 56-acre tract at Droyers' Point, for new airport, to include hangars, repair shops and other units, to cost over \$100,000 with equipment.

Gerd Electric Co., Inc., 187-193 Sylvan Avenue, Newark, N. J., has been incorporated with capital stock of \$125,000 to manufacture electrical equipment and appliances. It will specialize in fixed condensers, transmitting condensers and apparatus incorporating condensers. Company has taken space in factory of E. F. Volkmer & Sons, Inc.

McRae Brothers, 470 West Main Street, Patchogue, N. Y., who have been in business as roof and sheet metal contractors for four years as a partnership, have incorporated as McRae Brothers, Inc.

Machinery Liquidating Co., 246 Fifth Avenue, New York, has been incorporated to deal in second-hand machinery and equipment. Company is in market for used textile machinery.

Whiting-Adams Co., Boston, manufacturer of quality brushes, has established branch sales offices at 30 Church Street, New York, to take care of export and industrial business. Charles A. Darby, Jr., district sales manager, will be in charge.

Buffalo

BUFFALO, April 22.—Work will soon begin by Arrow Head Steel Products Corporation, Minneapolis, Minn., manufacturer of engine parts, pistons, wrist pin assemblies, etc., on first unit of new plant at Buffalo, one-story, totaling 50,000 sq. ft. floor space, to cost about \$400,000 with equipment. Other units will be built later for total floor space of 200,000 sq. ft., to cost \$1,000,000 with machinery.

Rochester Paring Machine Co., Rochester, N. Y., recently formed by Henry Mehserle, 202 Depew Street, and associates, with capital of \$60,000, plans operation of local factory to manufacture special cutting machines and parts.

Multi-cell Radiator Corporation, 80 Terrace Street, Buffalo, manufacturer of copper radiators, heating systems, etc., has purchased property at Lockport, N. Y., for new plant, to cost more than \$60,000 with equipment. Arthur B. and Charles A. Harrison are heads.

Binghamton Gas Works, Binghamton, N. Y., operated as a unit of American Light & Traction Co., 120 Broadway, New York, is planning new pumping plant and distributing system for service at Binghamton, Endicott and vicinity, to cost \$100,000 with equipment.

Weed & Co., 95-101 Swan Street, Buffalo, hardware and mill supplies, will rebuild five-story storage and distributing plant destroyed by fire April 17.

City Council, Buffalo, has authorized bond issue of \$375,000 for purchase of 37 acres adjoining airport on Genesee Street, and will carry out expansion, including construction of hangars, repair shops and other units.

John Lagoe & Sons, Oswego, N. Y., have awarded contract to Austin Co., for a machine shop, 90 x 120 ft. A 10-ton crane will be installed.

Philadelphia

PHILADELPHIA, April 22.—Contract has been let by Walker Brothers, 1417 Sansom Street, Philadelphia, manufacturers of electrical equipment, to Frank G. Stewart, 1520 Locust Street, for three-story plant, 100 x 120 ft., at Spring Mill, Pa., to cost more than \$100,000 with machinery. Ralph Bencker, Thirteenth and Chestnut Streets, Philadelphia, is architect.

Brown Instrument Co., Roberts and Wayne Avenues, Philadelphia, manufacturer of measuring instruments, has asked bids for a two-story and basement addition, 80 x 219 ft., to cost about \$80,000 with equipment. Ballinger Co., Twelfth and Chestnut Streets, is architect and engineer.

Dodge Steel Corporation, State Road and Hellerman Street, Philadelphia, has awarded general contract to the Austin Co. for a one-story foundry addition, to cost about \$30,000 with equipment.

Atlantic City Electric Co., Atlantic City, N. J., has plans for three-story and basement substation and switching plant at Williamstown, N. J., to cost about \$350,000 with equipment. Extensions will be made in transmission lines. C. H. Higgins, 101 Park Avenue, New York, is architect.

New Jersey Seating Co., Trenton, N. J., has been formed with capital of \$200,000 to manufacture school seats, etc., and will take over New Jersey School Furniture Co., with plant at Murray and Artisan Streets.

Board of Education, Glen Mills, Pa., has authorized plans for rebuilding of four-story mechanical and manual arts school, recently damaged by fire, to cost about \$100,000 with equipment. Stewardson & Page, 315 South Fifteenth Street, are architects.

Penn Mfg. Co., 152 Hornen Street, Wilkes-Barre, Pa., manufacturer of coal mining supplies, plans rebuilding storage and distributing plant destroyed by fire April 17.

High Pressure Pump Corporation, Wilkes-Barre, Pa., recently organized by P. J. Shaughnessy, 162 Searle Street, Pittston, Pa., and associates, plans operation of local plant to manufacture pumping machinery and parts. Frank L. Pinola, 85 James Avenue, Kingston, Pa., is also interested in organization.

Susquehanna Collieries Co., Commercial Trust Building, Philadelphia, has authorized electrification of its William Penn and Lytle collieries and coal-mining plants near Shamokin, Pa., to cost over \$100,000 with equipment.

Pedrick Tool & Machine Co., Philadelphia, has been incorporated with capital stock of \$60,000 to succeed to partnership under same name. Company deals in machine tools. A. D. Pedrick and H. A. Pedrick remain with organization.

Lancaster Iron Works, Inc., Lancaster, Pa., builder of tanks, brick machinery, riveted and welded pipe and other products, has acquired Hahn Engineering Co., Philadelphia, manufacturer of conveyors for coal, ashes, coke, etc., which also has plant at Lancaster.

Atlantic Iron & Metal Co., Atlantic City, N. J., has been incorporated with a capitalization of \$175,000 and has taken over scrap business under same name. In addition to operating scrap yards, Atlantic Iron & Metal Co. engages in wrecking operations.

National Umbrella Frame Co., Philadelphia, has removed its general offices to Penn and Belfield Streets, Germantown, Philadelphia. It manufactures lock washers and wire products.

Detroit

DETROIT, April 22.—Board of Education, Grand Rapids, Mich., is asking bids on general contract until May 3 for five-story vocational and technical high school, to cost \$550,000 with equipment. Turner & Thebaud, Michigan Trust Building, are architects. W. W. Bradfield, last address noted, is engineer.

Mead Machine Co., Monroe, Mich., recently reorganized with George Mead as president and manager, is arranging for production of automobile parts with facilities for large output. Manufacture will also cover marine engines and gasoline motors.

Buhl Aircraft Co., Marysville, Mich., has acquired property about one mile square, at St. Clair, Mich., for development of a landing field. Work will soon begin on hangar, 90 x 150 ft., with repair facilities and other field units. Company also plans new one-story aircraft assembling works at new location, to supplement production at Marysville plant, as well as other mechanical units. Entire project will cost about \$450,000. Herbert Hughes is vice-president and general manager.

Sparks-Withington Co., North Street, Jackson, Mich., manufacturer of radio equipment, automobile signal horns, etc., has awarded general contract to Boldt Construction Co., 1969 East Seventieth

Street, Cleveland, for three-story addition, 60 x 250 ft., to cost \$150,000 with equipment.

Consolidated Paper Co., Monroe, Mich., has awarded general contract to W. H. Krapp Co., Monroe, for storage and distributing unit, to cost \$150,000.

Duluth, South Shore & Atlantic Railroad Co., Marquette, Mich., is reported planning construction of new local ore dock, with loading machines, conveying and other handling equipment, to cost over \$1,500,000.

McManus Steel Co., 3290 Wight Street, Detroit, has awarded general contract to E. F. Long, Hammond Building, for one-story addition to storage and distributing plant, to cost \$55,000 with equipment.

Schlee-Brock Aircraft Corporation, Detroit, local representative for Lockheed Aircraft Co., Los Angeles, has begun construction of new hangar at Detroit City Airport, with capacity for 15 airplanes, and will build group of other structures to cost \$50,000. Lockheed company is reported considering new assembling plant at Detroit. Edward F. Schlee is president of first-noted company.

Cadillac Motor Car Co., 2860 Clark Street, Detroit, has acquired property adjoining plant for construction of additions in connection with expansion program to cost about \$5,000,000.

Chadwick Mfg. Co., Turner and Cortland Avenues, Detroit, manufacturer of bearings, etc., has filed plans for a one-story addition, to cost about \$40,000 with equipment.

Ainsworth Mfg. Corporation, Detroit, has been incorporated with capital stock of \$2,000,000 and has taken over Ainsworth Mfg. Co., manufacturer of automobile windshields, stampings, rolled shapes and machine parts.

New England

BOSTON, April 22.—Business in new machine tools the past week was spotty, but larger in volume than the previous week. Sales included large planers, milling machines, boring mills, radial drills, shapers, lathes, and grinding equipment, mostly for users in the Connecticut River valley. Some sales were made to companies which had previously contracted for tools from manufacturers who could not make deliveries on specified dates. New inquiries are fairly numerous, but call for only one or two tools to a customer. Business in used tools is curtailed because of scarcity of good conditioned equipment.

New England metal-working industry continues at a high level, with some shortage of desirable help. Most plants have a sufficient backlog to assure operations at the current rate well into the second half of the year.

John L. Porter, Oxford Street, Somerville, Mass., has started construction of a one-story machine shop.

Springfield Bronze Co., Springfield, Mass., will build a foundry addition and install new equipment.

Kinne & Palmer, Derby, Conn., architects, have awarded a contract for an addition to plant of Hershey Metal Products Co., Derby, Conn. Miscellaneous metal and electrical equipment will be required.

Equipment of Stewart-Walker Foundry Corporation, Southington, Conn., was sold at auction April 23.

Plant and property of Hart & Cooley Mfg. Co., New Britain, Conn., heating

registers, radiator sheaths, etc., have been sold to Hart & Hutchinson Co., that city. It is reported that some machinery of parent company will be moved to Mid-Western plants, and that production of New England plants will be speeded up by installation of new equipment.

Ideal Auto Body Works, Hartford, Conn., has awarded general contract to Carlson & Torell Co., New Britain, Conn., for new two-story plant, 36 x 90 ft., to cost about \$35,000 with equipment. Adolf Feinberg, Hartford, is architect.

Edison Electric Illuminating Co., 39 Boylston Street, Boston, has purchased property at Everett, Mass., adjoining plant of Massachusetts Gas Co., and plans construction of steam-operated electric power plant to cost over \$15,000,000 with transmission lines.

Bay State Casket Co., Elbow Street, Boston, has plans for a four-story plant, 60 x 70 ft., to cost about \$75,000 with equipment. M. E. Levy, 43 Tremont Street, is architect.

Blake & Johnson Co., 1495 Thomason Avenue, Waterbury, Conn., manufacturer of machine screw products, machine screws, etc., has awarded general contract to C. H. Kinney Co., Inc., 535 Watertown Avenue, for one-story addition, 53 x 138 ft., with L-extension, 32 x 32 ft., to cost about \$80,000. Fred A. Webster, Waterbury, is architect.

Attleboro Steam & Electric Co., South Main Street, Attleboro, Mass., has plans for a new power house, to cost about \$100,000 with equipment. O. M. Higgins, Park Street, is architect.

Thompson Wire Co., Worcester, Mass., has awarded general contract to Clark & Smith, Worcester, for two-story plant unit to cost about \$25,000.

Department of Parks, City Hall, Boston, has plans for one and two-story automobile service, repair and garage building at Jeffries Point airport, 75 x 120 ft., and 30 x 45 ft., to cost about \$125,000 with equipment. W. D. Austin, 120 Boylston Street, is architect.

Board of School Trustees, Bloomfield, Conn., has authorized installation of manual training department in two-story high school, to cost about \$250,000. Plans are being completed by Walter P. Crabtree, Hartford, Conn., architect.

American Roofing Co., 44 Retreat Avenue, Hartford, Conn., has been incorporated with capital stock of \$50,000 and has taken over roofing business established by W. E. Johnson, who remains as secretary and treasurer. E. L. Kirkham is president. Company will establish a warehouse for wholesaling of roofing materials and next fall will begin manufacture of fireproof and waterproof roof coatings and cement and also articles from sheet copper to be used in applying roofings. Company will be in market for machines for cutting and forming sheet copper, also presses.

Gulf States

BIRMINGHAM, April 22.—Plans are under way by Koretke Brass & Mfg. Co., 922 Magazine Street, New Orleans, for new one-story plant for foundry and plating divisions, to cost about \$25,000 with equipment.

Neonlight Laboratories, Inc., Los Angeles, Earl L. Murray, head, is planning construction of branch plant at El Paso, Tex., to manufacture electric signs and displays, to cost about \$80,000 with equipment.

Louisiana Gas & Fuel Co., Shreveport, La., N. C. McGowen, Shreveport, presi-

The Crane Market

INQUIRY for electric overhead cranes has been smaller in the past week than for some time, but there is a substantial volume of business pending. Of cranes to be bought in the New York district, there are three lists pending award, one for 10, one for 9 and another for 7 overhead cranes. There is a moderate volume of inquiry for locomotive cranes, but no awards have been reported in the past week.

Active inquiry for overhead cranes is reported in the Pittsburgh district with about 50 for subsidiary companies of the United States Steel Corporation.

Among recent purchases are: Southern Pacific Equipment Co., San Francisco, 40-ton, 8-wheel, steam-driven locomotive crane from Orton Crane & Shovel Co.

Kensington Steel Co., Kensington, Ill., 10-ton, 30-ft. span, 3-motor overhead crane from unnamed builder.

Byllesby Engineering & Management Corporation, Enid, Okla., 50-ton, 30-ft. span, 4-motor overhead crane from Middle Western builder.

Marion Steel Products Co., Marion, Ind., 10-ton overhead electric crane from Shaw Electric Crane Co.

dent, recently organized by Mr. McGowen, H. C. Couch, Pine Bluff, Ark., and associates, has acquired natural gas properties of Northern Louisiana Natural Gas Co., Southern Gas & Fuel Co., Industrial Gas Co., and other interests. New owner plans to consolidate and expand properties, including pipe line construction, booster stations, etc.

Wilson Mfg. Co., Wichita Falls, Tex., manufacturer of oil well equipment and supplies, is planning expansion, including one-story machine shop, warehouse and distributing plant, and other structures, to cost over \$50,000 with equipment.

Miami Aircraft Corporation, Miami, Fla., recently organized by J. M. Smoot, Miami, president and associates, is planning one-story plant to cost more than \$200,000 with equipment, including parts production and assembling.

American Smelting & Refining Co., 120 Broadway, New York, has work under way in cooperation with Nichols Copper Co., Long Island City, N. Y., for new plant at El Paso, Tex., to cost more than \$500,000 with equipment.

Packard Motor Car Co., Detroit, Mich., has plans for new factory branch, service, repair and sales building at San Antonio, Tex., two stories, 100 x 160 ft., to cost about \$100,000 with equipment. A. B. and R. M. Ayres, Bedell Building, are architects.

Chestnut & Smith Corporation, Tulsa, Okla., operating gasoline and oil refineries, is planning to rebuild part of tank car construction and repair shops at Ranger, Tex., recently destroyed by fire.

Lozano Cold Storage, Ice & Power Co., Harlingen, Tex., is considering construction of an electrically-operated ice-manufacturing and refrigerating plant with Diesel engine power house, to cost about \$70,000 with equipment.

Alabama Tire & Rubber Co., Huntsville, Ala., now being formed by J. E. Pierce, Huntsville, and associates, is planning construction of local mill to manufacture automobile tires and tubes, to cost more than \$850,000 with ma-

chinery. H. W. Lantz, Huntsville, is also interested in company and will be factory manager.

Ford, Bacon & Davis, Inc., 115 Broadway, New York, engineer, has been awarded general contract by Standard Oil Co. of New Jersey, 26 Broadway, New York; United Gas Co., Houston, Tex., and other associated interests, for pipe line from natural gas fields near Monroe, La., to point near St. Louis, 460 miles, to cost over \$20,000,000. Contracting company will act as engineer for project.

F. W. Krieter Battery Co., Beaumont, Tex., has plans for new one-story plant to manufacture and repair electric storage batteries, 65 x 120 ft., to cost about \$30,000 with equipment.

City Council, Teague, Tex., is considering construction of one-story municipal electric light and power plant, to cost about \$100,000 including transmission lines.

Virginia Bridge & Iron Co. has plans for a new unit on 30-acre site adjoining its Birmingham plant. It will have a capacity approximating that of present unit which it will replace to a large extent. Increased production will also be provided for. Grading work has been started.

Ingalls Iron Works Co., Birmingham, has started work on an addition to its main plant which will represent an investment of about \$100,000. New equipment will be installed. Work will be done by company's own force.

South Atlantic

BALTIMORE, April 22.—Contract has been let by Edward Katzinger Co., 1949 North Cicero Avenue, Chicago, manufacturer of tinware specialties and bakers' and confectioners' tools, to M. A. Long Co., 10 West Chase Street, Baltimore, for two-story branch plant at Baltimore, 145 x 180 ft., to cost about \$250,000 with equipment. Lockwood Greene Engineers, Inc., Chicago, is architect and engineer.

Board of District Commissioners, District Building, Washington, will receive bids until May 6 for metal-working and wood-working machinery for vocational training department of McKinley High School.

Brockway Motor Truck Corporation, 420 Lexington Avenue, New York, is said to be planning construction of new assembling plant at Atlanta, Ga., to cost over \$100,000 with equipment. Main plant is at Cortland, N. Y.

Williams Flying Service, Inc., Greenville, S. C., has authorized a machine and repair shop in connection with new hangar at local airport, and will likely remodel an existing unit for such service, to cost more than \$45,000.

Canton Co., Commerce and Water Streets, Baltimore, has awarded general contract to Sanford & Brooks Co., South and Water Streets, for one-story unit at terminal storage and distributing plant, 150 x 500 ft., to cost about \$75,000, and will install material-handling equipment.

Pitcairn Aviation, Inc., Land Title Building, Philadelphia, is planning construction of a hangar with shop and repair facilities at Candler Field, Atlanta, Ga., recently acquired by City Council, Atlanta, for a municipal airport, to cost more than \$85,000 with equipment. City will also develop hangar facilities, repair and field equipment buildings, etc., to cost over \$200,000.

Standard Oil Co., Columbia, S. C., W. R. Goodman, district manager, has asked

bids on general contract for storage and distributing plant, with two two-story main units, 60 x 120 ft., mechanical shop and other buildings, to cost about \$170,000 with equipment.

Jenkins Brothers, Columbia, S. C., has been appointed Southern sales representative for Western Screw Products Co., St. Louis.

Chicago

CHICAGO, April 22.—Railroad purchases are adding some life to this market which had begun to lag a trifle behind the rate maintained in the opening days of the month. The Santa Fe, St. Paul and the Burlington are buying against old inquiries and dealers are daily expecting a list from the Union Pacific. The Buda Co., Harvey, Ill., has closed its list but the American Steel Foundries continues to delay making purchases. Whiting Corporation, Harvey, Ill., will buy a lathe and the Pullman Car & Mfg. Corporation is buying for its Birmingham shops.

The used equipment market is active. Machine tools of the Sykes Co., Logansport, Ind., were sold this week. A dealer from the Pacific coast is covering Middle-Western and Eastern states in an effort to accumulate carloads of old machine tools for shipment to the West.

Link Belt Co., 310 West Pershing Road, Chicago, will build an addition, 120 x 141-ft., to cost \$40,000. Puckey & Jenkins, Wrigley Building, are architects.

Electrical Research Laboratories, Chicago, manufacturers of radio equipment, have acquired Cable Piano Co. plant at Twenty-second and Paulina Streets, which will afford considerably larger manufacturing space.

Bertram-Bredy Co., 549 West Washington Boulevard, Chicago, has been appointed Western representative for Eureka Metal Products Co., Northeast, Pa., manufacturer of commutators, commutator bars, screw machine parts, drop forgings, and brass, copper, steel and alloy castings.

E. H. Nordlie, 4825 North California Avenue, Chicago, architect, has asked bids on general contract for one-story automobile service, repair and garage building, to cost \$140,000 with equipment.

Anton Clemetsen Co., 3134 West Chicago Avenue, Chicago, manufacturer of cabinets, etc., is said to be planning a one-story addition, to cost about \$40,000 with equipment.

Northern Pacific Railway Co., Railroad Building, St. Paul, Minn., has plans for extensions and improvements in engine house and repair shops at Havre, Mont., to cost \$65,000 with equipment. T. D. McMahon is company architect.

Transformer Corporation of America, Inc., 1428 Orleans Street, Chicago, manufacturer of radio transformers and kindred equipment, has leased space in building at 2309-25 South Keeler Avenue, totaling 34,000 sq. ft., for expansion.

Evans Flexible Reamer Corporation, 3513 Lincoln Avenue, Chicago, is having plans drawn by Guske & Foster, 3725 Devon Street, architects, for new three-story plant on site recently acquired, to cost about \$75,000 with equipment.

Central Machine Works, 1234 Central Avenue, Minneapolis, Minn., has awarded general contract to Standard Construction Co., Plymouth Building, for two-story addition, to cost \$25,000 with equipment.

Globe Machinery & Supply Co., 205-11 Court Avenue, Des Moines, Iowa, has

awarded general contract to Arthur H. Neumann & Co., Hubbell Building, for one-story and basement plant, 130 x 132 ft., to cost about \$40,000 with equipment. Fred W. Swanson is president.

Board of Trustees, State Soldiers' Home, Hot Springs, S. D., will soon take bids for new power plant, to cost \$65,000 with equipment. Perkins & McWayne, Paul-ton Building, Sioux Falls, S. D., are architects.

Municipal Utilities Co., Liberty Building, Des Moines, Iowa, H. T. Cory, head, has secured permission to construct a new electric light and power plant and system at Sumner, Iowa, to cost about \$100,000 with equipment.

Machine tool equipment of the Velie Motor Corporation, Moline, Ill., will be offered for sale at Moline on May 8 by Samuel L. Winternitz & Co., auctioneers, Chicago.

Sullivan Machinery Co. has moved its Chicago offices from Peoples Gas Building, to 400 North Michigan Avenue.

Cleveland

CLEVELAND, April 22. — Although there has been some slowing down in machine tool business and inquiry as compared with last month, the volume of orders continues good. Some hesitation has developed among buyers because of the far extended deliveries. Delivery dates on some sizes of plain and universal milling machines, grinders and automatic screw machines now range from October to December. Some buyers who would place orders for early delivery if the machines could be secured, have indicated that they would like to purchase machinery subject to cancellation should they find a few weeks before the promised delivery that they are no longer in need of the tools.

Business is well distributed among the metal-working industries. Purchases during the week included eight tool room machines by a Detroit copper mill, three turret lathes by a northern Ohio steel plant, a 52-in. boring mill by Griscom-Russell Co., Massillon, Ohio, and several machines by Deming Co., Salem. Demand for presses continues active. Geometric Stamping Co., Cleveland, has purchased seven presses of various sizes for its new plant.

Hocking Valley Railroad will build an ore and coal handling dock at Toledo and has sent out tentative inquiries for both ore and coal handling equipment.

Burns Motor Co., 68 West Exchange Street, Akron, Ohio, will soon take bids on general contract for two-story service, repair and garage building, to cost \$170,000 with equipment. H. L. Wardner, Everett Building, is architect.

American Fork & Hoe Co., B. F. Keith Building, Cleveland, has awarded general contract to Rice-Jones Co., 1836 Euclid Avenue, for two-story addition to plant at Geneva, Ohio, 45 x 200 ft., to cost about \$75,000 with equipment.

Cleveland Cap Screw Co., 2921 East Seventy-ninth Street, Cleveland, has awarded general contract to R. E. Nixon, 10006 Carnegie Avenue, for one-story addition, to cost more than \$60,000 with equipment.

Atlas Steel & Supply Co., 4401 Trumbull Avenue, Cleveland, has asked bids on general contract for a one-story addition, 50 x 200 ft., to cost about \$50,000 with equipment. R. H. Hinsdal, Erie Building, is architect.

Steemoll Burner Co., Cleveland, has been incorporated to manufacture oil burners. For present, company will contract for building this equipment under a licensing arrangement. It is represented by P. L. Thornbury, Swetland Building, Cleveland.

Cincinnati

CINCINNATI, April 22.—Although a few machine tool builders have booked more business this month than in March, the majority reports a slight recession. Inquiries continue good, with indications that sales during the next few months will hold up to a fairly high level. However, most manufacturers believe that the peak of the recent upward swing has passed and that the volume of orders will show a slow, but progressive decline. The decrease is expected to be seasonal and is not being interpreted by machine tool executives as a forerunner of the end of the present period of good business. With the slowing down of fresh bookings has come an improvement in deliveries, which range from six to eight weeks, and even longer on certain types of tools.

Orders have been well distributed among various industries. Almost without exception sales have consisted of from one to three machines. Production in local shops is being maintained at capacity with no deviation from the present schedule in prospect within the next 60 days.

Chesapeake & Ohio Railway is inquiring for the following tools, all motor driven, 440 volt, three-phase, 60 cycle:

Four 14-in. geared-head engine lathes.

Three 18-in., one 20-in., one 30-in. and two 36-in. engine lathes.

One 24-in., one 42-in., two 36-in. and one 54-in. vertical turret lathes.

In addition, this railroad is expected to buy a planer, crank shaper and several other tools. R. M. Nelson, Richmond, Va., is purchasing agent.

Carlton Machine Tool Co., Spring Grove Avenue and Meeker Street, Cincinnati, manufacturer of radial drills, has plans for an addition to contain about 14,000 sq. ft. of floor space, to be ready for occupancy within 60 days.

Adams Steel Co., 1002 American Building, Cincinnati, has been incorporated with capital of \$1,000 and will continue to act as selling agents in this district for Erie Forge Co., Apollo Steel Co., Central Iron & Steel Co., and Kerlow Steel Flooring Co. Officers are Percy H. Adams, president; O. S. Adams, vice-president; and Rose Isreal, secretary and treasurer.

Buckeye Incubator Co., Springfield, Ohio, manufacturer of radio cabinets and incubators, and United Reproducers Corporation, Rochester, N. Y., manufacturer of radio sets, have been merged. Incubator division of former company will continue as division of United Reproducers Corporation, and radio cabinet plant at Springfield will expand operations. United Reproducers Corporation is a consolidation of United Radio Co., Rochester; Newcombe-Hawley Co., St. Charles, Ill., and Precision Products Co., Ann Arbor, Mich.

Aeronautical Corporation of America, Inc., Chamber of Commerce Building, Cincinnati, C. G. Dietz, head, has awarded general contract to Midland Building Co., 2513 Burnet Street, for one-story plant at Luken airport, for parts production and assembling, to cost about \$65,000 with equipment. H. Nelson Jackson, Mercantile Library Building, is architect.

Louisville Electrical Mfg. Co., Magazine Street, Louisville, is planning a one-story addition to cost about \$25,000 with equipment.

City Council, Jackson, Tenn., is reported planning a municipal electric light and power plant, to cost over \$500,000 with transmission system. Bond issue has been authorized by State.

Firestone Tire & Rubber Co., Akron, Ohio, is having plans drawn for a factory branch, storage and distributing plant at Cincinnati, to cost about \$160,000 with equipment. Samuel Hannaford & Son, Dixie Terminal Building, Cincinnati, are architects.

Master Electric Co., Davis Avenue, Dayton, Ohio, manufacturer of electrical equipment, is considering an addition, to cost about \$40,000 with equipment.

City Council, Chattanooga, Tenn., will purchase 26-acre tract at Chickamauga, about eight miles from city, as site for municipal airport, and will have plans drawn for hangars, repair shops and other units. E. H. Betts is city engineer.

Chevrolet Motor Co., Detroit, has awarded general contract to E. G. Holladay Co., 1700 Broad Street, Nashville, Tenn., for factory branch and parts distributing plant at Knoxville, Tenn., to cost about \$100,000 with equipment.

Estate Stove Co., East Avenue, Hamilton, Ohio, has awarded general contract to Benzing & Son, 709 South Ninth Street, for one-story machine and mechanical shop, 42 x 108 ft., and one-story foundry addition, 30 x 56 ft., to cost over \$40,000 with equipment.

Kalman Steel Co., Niles, Ohio, has begun erection of one-story addition, 80 x 140 ft., for production of steel bars for concrete reinforcement, to cost about \$40,000 with equipment. Headquarters are in Wrigley Building, Chicago.

American Air Filter Co., Louisville, Ky., has acquired 39 foreign and United States patents and 59 applications for patents now pending covering unit and automatic air filters of both dry and viscous types and has licensed following manufacturers under these patents and applications: General Air Filter Corporation, Midwest Air Filters, Inc., National Air Filter Co. and Reed Air Filter Co. Companies will continue to operate as individual organizations, but will have a centralized research department.

Pittsburgh

PITTSBURGH, April 22.—Machinery dealers still find business good, both in point of sales and inquiry. The Chesapeake & Ohio Railway, which has inquired for several tools for its new shop at Huntington, W. Va., and its existing shop at Richmond, Va., is seeking prices on other items. The Westinghouse Electric & Mfg. Co. is buying steadily against its second quarter list. In heavy equipment, interest centers in requirements of the Republic Iron & Steel Co. which will spend \$10,000,000 in modernizing and enlarging its Youngstown plants.

Standard Underground Cable Co., Seventeenth and Pike Streets, Pittsburgh, a division of General Cable Co., 420 Lexington Avenue, New York, is said to have plans for one-story addition to plant at Perth Amboy, N. J., to cost about \$200,000 with equipment.

Aluminum Co. of America, Inc., Oliver Building, Pittsburgh, has plans for a new unit at New Kensington, Pa., to cost more than \$400,000 with equipment. H. H. Hornbostel, address noted, is company engineer.

Fourth Avenue Garage Co., Pittsburgh, D. A. Crone, 212 Oliver Avenue, architect, in charge, will take bids at once for seven-story service, repair and garage building, to cost about \$300,000 with equipment.

Taylor Aircraft Corporation, Rochester, N. Y., has authorized erection of one-story plant at Bradford, Pa., for parts production and assembling, to cost more than \$50,000 with equipment. Plant at Rochester will be removed to new location.

Armstrong Electric & Mfg. Co., Huntington, W. Va., manufacturer of hardware and electrical products, is arranging for expansion, to include manufacture of new household electrical specialties. Col. R. Potter Campbell is chairman of board.

State Board of Control, Charleston, W. Va., is planning construction of new vocational school unit at West Virginia State College, to cost over \$100,000 with equipment. It is understood that plans will be drawn by V. C. Pettit, Kanawha Bank & Trust Building, Charleston, architect.

Manion Steel Barrel Works, Inc., Rouseville, Pa., has awarded general contract to E. J. Uhl Co., 4700 Second Avenue, Pittsburgh, for new one-story plant at Oil City, Pa., to cost about \$100,000 with equipment.

Barney Machinery Co., Pittsburgh, has moved from Union Trust Building to new and larger quarters at 2410 Koppers Building.

Silvania Products Co., Emporium, Pa., maker of radio tubes, has awarded contract for design and construction of new factory to Rust Engineering Co., Pittsburgh. It will cost about \$250,000.

Leeds & Northrup Co., Philadelphia, announces appointment of Bradshaw & Co., 530 Fourth Avenue, Pittsburgh, sales agents in Pittsburgh and Cleveland area for Leeds & Northrup metered combustion apparatus.

Milwaukee

MILWAUKEE, April 22.—Machine-tool demand continues active, but there is evidence that some of the heaviest buyers of recent months, especially the automotive industries, have filled their principal needs. Tool builders, however, have all the work they can take care of for several months.

Manitowoc Plating Works, Manitowoc, Wis., recently acquired and now being operated by Aluminum Goods Mfg. Co., kitchen utensils, Manitowoc, is being enlarged by a five-story manufacturing and storage addition, 150 x 200 ft. General contract has been placed with Walter W. Oefflein, Inc., 110 East Wisconsin Avenue, Milwaukee.

White Machine Co., 427 Water Street, Eau Claire, Wis., has placed general contract with Hoeppner-Bartlett Co., local, for a machine shop addition, 48 x 50 x 30 ft.

Hamilton Aero Mfg. Co., Concordia Avenue and Bremen Street, Milwaukee, division of United Aircraft & Transport Corporation, and manufacturing metal and wood propellers, will double its purchase of new equipment, recently fixed at \$100,000, utilizing all plant area of 68,000 sq. ft. available in recently acquired factory. New list is now being compiled.

Massey-Harris Co., Racine, Wis., manufacturer of farm machinery, has leased 10,000 sq. ft. in Bay View plant of Pfister & Vogel Leather Co. at Milwaukee, for

additional assembling area, deriving parts largely from factory at Toronto.

Common Council of La Crosse, Wis., has authorized bond issue of \$50,000 for building and equipping extension to La Crosse Vocational School. Work will begin about June 1. Joseph B. Funke is president of vocational board.

Common Council of Sturgeon Bay, Wis., has instructed James Johnson, superintendent city water commission, to secure estimates on new 500,000-gal. steel water tank. Edward S. Ackerman is city clerk.

Luther Grinder Mfg. Co., 285 South Water Street, Milwaukee, has changed name to Luther, Inc. Besides grinders, company is now manufacturing vibrating exercising machines and other mechanical specialties.

Pabst Corporation, 917 Juneau Avenue, Milwaukee, has plans by M. Fernekes, architect, for three-story garage and service building, 100 x 300 ft., to cost about \$200,000.

Generating Gear Co., 1245 Twenty-third Avenue, Milwaukee, manufacturer of gears, is starting work on a one-story shop addition, 60 x 130 ft., to double present capacity.

Walter Gerlinger, 403 Sixty-sixth street, Milwaukee, formerly of Gerlinger Steel Casting Co., has incorporated Interstate Supply & Equipment Co., Milwaukee, to deal in foundry equipment and supplies.

Plant of H. & M. Body Corporation, Racine, Wis., formerly manufacturing inclosed car bodies for Hupp Motor Car Co., Detroit, and Mitchell Motor Co., Racine, will be sold at public auction May 6. Buildings have been idle several years and are now owned by Murray Body Corporation, Detroit. Joint agents at sale are Norton Realty Co., Racine, and Gerth's Realty Experts, Inc., New Orleans. Appraised value of plant is \$590,000.

Waukesha Tool Corporation, Waukesha, Wis., will occupy its new plant at 133 Albert Street, this week.

Young Radiator Co., Racine, Wis., reports heavier shipments in March than any month in its history. Company's products include several new developments in cooling field. F. M. Young is president.

St. Louis

ST. LOUIS, April 22.—St. Louis-San Francisco Railway Co., Frisco Building, St. Louis, has plans for addition to engine house and shops at Lindenwood yards, to cost \$130,000 with equipment. R. C. Stevens is chief engineer; and F. G. Jonah, company architect.

Independence Stove & Furnace Co., 700 South Cottage Street, St. Louis, has awarded general contract to L. W. Weeks, 633 South Fuller Street, for one-story addition, 65 x 120 ft., for enameling, to cost \$55,000.

Champlin Hardware Co., 205 West Main Street, Enid, Okla., has work under way on one-story storage and distributing plant, 50 x 160 ft., to cost about \$22,000 with equipment. H. C. Rogers is general manager.

Arrow Aircraft & Motors Corporation, Havelock, Lincoln, Neb., recently organized to take over Arrow Aircraft Co., has arranged for a stock issue to total \$562,000, part of fund to be used for expansion.

Henry A. Jones, New Madrid, Mo., and associates are planning establishment of local plant to manufacture valves for automobile tires and other automotive accessories.

Cessna Aircraft Co., Wichita, Kan., has awarded general contract to Henrlon Improvement Co., Schweiter Building, for one and two-story plant for parts production and assembling.

International Harvester Co., 606 South Michigan Avenue, Chicago, has taken bids on general contract for new factory branch and distributing plant for motor truck division at Dodge City, Kan., to cost \$140,000 with equipment.

A. P. Green Fire Brick Co., Mexico, Mo., has awarded general contract to H. K. Ferguson Co., Cleveland, for one-story grinder unit, to cost more than \$70,000 with machinery.

Universal Aviation Corporation, 430 Gray Street, St. Louis, Col. Halsey Dunwoody, head, has plans for two hangars, with repair and reconditioning shops in Fairfax industrial district, Kansas City, Mo., to cost more than \$70,000 with equipment. Love-Sultan, Inc., 6625 Delmar Boulevard, St. Louis, is engineer.

Coca-Cola Bottling Co., 615 East Markham Street, Morrilton, Ark., has awarded general contract to George H. Burden Co., Moore & Turner Building, Little Rock, Ark., for two-story bottling plant to cost \$80,000, to include installation of automatic bottling machinery, conveying and other equipment.

City Council, Muskogee, Okla., has authorized a bond issue of \$195,000 for extensions in municipal airport, including hangars, repair shops, oil storage and other buildings.

Jones Tube Valve Co., New Madrid, Mo., has been incorporated with capital stock of \$35,000 to manufacture automobile valves. If arrangements can be made, company will have the valves manufactured in an outside shop; otherwise it will purchase equipment and do its own manufacturing.

Von Hoffmann Aircraft Co., airplane distributor, will erect an assembly plant for Eaglerock airplanes at Lambert-St. Louis field.

Indiana

INDIANAPOLIS, April 22.—Electric Sprayit Co., Stephenson Building, South Bend, manufacturer of spraying equipment, has asked bids on general contract for one-story addition, to cost about \$45,000 with equipment. William E. Fett, Associates Building, is architect.

Aladdin Mfg. Co., Muncie, manufacturer of metal goods, lamps, etc., has awarded general contract to W. R. Dunkin, Huntington, for one-story unit at Alexandria, 90 x 130 ft., to cost about \$45,000 with equipment. S. D. Goodwin is plant superintendent.

Peerless Electric Supply Co., 118 South Pennsylvania Street, Indianapolis, has leased four-story building at 122 South Meridian Street, totaling about 20,000 sq. ft., for new storage and distributing plant. Present works will be removed to new location.

Quaker Maid Co., operated by Great Atlantic & Pacific Tea Co., 420 Lexington Avenue, New York, has plans for cereal mill at Terre Haute, to cost over \$400,000 with machinery.

City Council, Indianapolis, has authorized early call for bids for new power plant at city hospital, for which an appropriation of \$530,000 has been arranged. C. R. Ammerman, Continental Bank Building, is engineer.

Robbins Body Corporation, 1148 Division Street, Indianapolis, is discontinuing automobile body manufacture at local plant and larger part of works is being

converted for radio cabinet and kindred production for United States Radio & Television Corporation, Chicago. Company will become a unit in consolidation of Chicago organization with group of interests at Indianapolis and Marion.

Curtiss Flying Service of Indiana, Indianapolis, an interest of Curtiss Aeroplane & Motor Co., Buffalo, has approved erection of hangar, with repair and reconditioning shop facilities, at Mars Hill flying field, to cost \$80,000 with equipment. H. Weir Cook is head of local company.

Pacific Coast

SAN FRANCISCO, April 18.—Contract has been let by Lyon Metal Products Co., Aurora, Ill., to William P. Neil Co., Inc., 4818 Loma Vista Avenue, Los Angeles, for one-story branch plant at Los Angeles, 85 x 177 ft., to cost about \$40,000 with equipment.

Regan Forge & Engineering Co., San Pedro, Los Angeles, is considering one-story addition to plant on Smith's Island, to cost about \$65,000 with equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is said to be planning additions to plant at Emeryville, Cal., to cost over \$100,000 with equipment. Engineering department of company is in charge.

Kohlenberger Engineering Co., Fullerton, Cal., manufacturer of mechanical equipment, has plans for one-story plant, 70 x 100 ft., to cost about \$40,000 with equipment.

Commonwealth Utilities Corporation, operating electric light and power properties at Phoenix, Tucson and Mesa, Ariz., and in other localities, has arranged for a stock issue to total \$1,500,000, part of proceeds to be used for extensions and improvements.

Municipal power department, Logan, Utah, H. C. Maughan, manager, is arranging call for bids for a 1000 to 1200-hp. Diesel engine and electric generator of 750 to 1000 kw. capacity, with auxiliary equipment, for municipal electric light and power station.

Commercial Iron Works, East Harrison and Union Streets, Portland, has awarded general contract to George E. Mangas, Spalding Building, for one-story foundry unit, to cost about \$24,000 with equipment.

Enterprise Oil Burner Co., 2902 Nineteenth Street, San Francisco, manufacturer of oil burners and oil burning equipment, is considering one-story plant, to cost about \$35,000 with equipment.

Hines Lumber Co., Burns, Ore., has plans for new lumber mill, to cost more than \$1,000,000 with machinery. Headquarters are at 3421 South Lincoln Street, Chicago. F. W. Pettibone will be in charge of construction.

Coast Oil Fields Supply Co., 822 East Sixtieth Street, Los Angeles, has awarded general contract to Harman Pacific Co., 422 East Third Street, for one-story machine shop, 45 x 50 ft., to cost about \$20,000 with equipment.

American "Form-Hold" Corporation of Delaware and Concrete "Form-Hold" Corporation, Culver City, Cal., have been merged. Officers and organization of latter will not be changed.

Washington Iron Works, Seattle, is opening a factory branch and warehouse in Portland, Ore., and will erect a concrete building to serve that district.

Company manufactures logging, mining and hoisting engines, logging blocks and marine and stationary Diesel engines. A full stock of repairs will be carried. Herald Synnestvedt is manager at Portland.

Canada

TORONTO, April 22.—Demand for machine tools declined slightly the past week, but aggregate sales were in good volume. Both builders and dealers report large unfilled orders for delivery over the next three or four months. Wood-working tools also are in strong demand in some parts of the country; small tools are moving freely.

Plans are being prepared for an addition to molding plant of Guelph Stove Co., Guelph, Ont., operated by the T. Eaton Co., Ltd., 190 Yonge Street, Toronto. It will cost about \$250,000, and work will be started immediately. W. A. Mahoney, 73 Queen Street West, is architect.

Andrew Malcolm Furniture Co., Listowel, Ont., has plans for a three-story addition.

Goodyear Cotton Co., care of the Goodyear Tire & Rubber Co., Simcoe and Richmond Streets, Toronto, has plans for a \$1,500,000 factory at St. Hyacinthe, Que., three stories and basement, 110 x 308 ft.

Brantford Roofing Co., Brantford, Ont., will build a \$40,000 addition to its local plant and an addition to its plant at Thorold, Ont., to cost \$20,000.

Windsor Gas Co., Chatham Street, Windsor, Ont., contemplates erection of a gas plant to cost \$1,000,000.

Excavation work is under way for a plant for Toronto Iron Works, Ltd., Toronto, to cost \$500,000. E. H. Darling, Hamilton, Ont., is engineer.

Gatineau Power Co., Jackson Building, Ottawa, Ont., will start work May 1 on erection of a substation at Hawkesbury, Ont., to cost \$335,000.

Bids will be called soon for a power house at Hull, Que., to cost \$50,000. Theodore Lancot, City Hall, is City engineer.

Western Canada

Robin Hood Mills, Fifth and High Streets, Moose Jaw, Sask., will build addition to its elevator to cost \$200,000.

Vulcan Iron Works, Point Douglas, Winnipeg, Man., has let contract to Sutherland Construction Co., for a new unit, 175 x 275 ft., to cost \$150,000. Electric cranes and heavy machinery will be installed.

Foreign

WORK is under way on new plant at Paris, France, for Crane Co., 836 South Michigan Avenue, Chicago, to manufacture heating equipment, valves, steam specialties, etc., to cost over \$200,000.

La Junta de Obras del Puerto de Sevilla, Spain (Port of Seville), is said to be planning early call for bids for six electric traveling cranes.

Ronson Art Metal Co., Ltd., London, England, has been formed by officials of Art Metal Works, Inc., 7 Mulberry Street, Newark, N. J., as a subsidiary, and plans establishment of plant near London to manufacture pocket lighters and line of metal goods. Cadogan Co., Ltd., London, will be interested in new company. Louis V. Aronson is president of parent company.

